HP ProLiant Cluster F500 DT Installation Guide

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Audience assumptions

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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HP ProLiant Cluster F500 for EVA introduction

This guide provides supplemental information for setting up an HP ProLiant Cluster F500 Disaster Tolerant for EVA configuration using HP StorageWorks Continuous Access EVA software. This guide serves as a link between the various clustering guides needed to complete a DT cluster installation. Other guides include:

- *HP ProLiant Cluster F500 Installation Guide*
- *Best Practices Guide — ProLiant Cluster HA/F500 for Enterprise Virtual Array (HSV100/HSV110) Using Microsoft Windows 2000 Advanced Server and Microsoft Windows Server 2003, Enterprise Edition*
- HP StorageWorks Continuous Access EVA Design Reference Guide

For the latest version of the reference guide and other Continuous Access EVA documentation, access the HP storage website (http://h18006.www1.hp.com/storage/index.html).

Disaster tolerance for EVA

Disaster-tolerant solutions provide high levels of availability with rapid data access recovery, no single point of failure, and continued data processing after the loss of one or more system components in a cluster configuration. Data is simultaneously written to both local and remote sites during normal operation. The local site is known as the source site because it is in control of the operation. The remote site is known as the destination site because it is where the information is copied.

Copied data resides at both the source and destination sites. However, in base DT cluster configurations under normal conditions, host data access occurs only through the source site. Processing will migrate to the destination site and continue normal operation if a component failure or a catastrophe occurs at the source site.

HP ProLiant Cluster F500 for EVA overview

The HP ProLiant Cluster F500 DT for EVA configuration is a two-node cluster for Microsoft® Windows® 2000 Advanced Server or a two-to-eight-node cluster for Microsoft® Windows® Server 2003, Enterprise

Edition. The DT configurations use HP ProLiant servers, HP StorageWorks storage subsystems, HP StorageWorks Continuous Access software, HP OpenView software, and HP StorageWorks Secure Path software.

This solution combines the failover functionality of Microsoft® Cluster Server with the remote data mirroring functionality of Continuous Access. This solution also allows for a distance of up to 100 km between a primary (local) external storage subsystem and a mirrored (remote) external storage subsystem. The server-to-storage connection is based on a Fibre Channel switch, using a shortwave connection, and server-to-server communication, using Ethernet over FDDI or FCIP connections. The extended Continuous Access EVA-over-IP configuration is similar to the simple Continuous Access EVA configuration except for the use of Fibre Channel-to-IP gateways. Two gateways are required at each site, one per fabric, for a total of four per solution, dedicated to that solution. When multiport gateways become available, each port must be dedicated to another single port.

The ProLiant server nodes in the cluster are connected or stretched over a distance. Up to two storage subsystems for FCIP connections and four storage subsystems for non-FCIP connections can be used at one site. These storage subsystems act as the source sites for the Continuous Access software and process disk subsystem requests for all nodes in the cluster. The storage subsystems are connected to the server nodes by means of redundant Fibre Channel connections that are managed by Secure Path. Additionally, the source storage subsystems are connected by means of redundant longwave fiber/FCIP connections to the destination site. As with standard ProLiant clusters using Microsoft® operating systems, MSCS manages failovers at the server and application levels.

The Continuous Access software functions at the redundant storage controller level in each of the storage subsystems and performs synchronous mirroring from the source site to the destination site, creating an exact copy of the cluster-shared disk. A manual recovery process performed at the destination site enables access to the mirrored data in the event of a disaster at the source site. The cluster is functional again within minutes, and application processing can continue.

The F500 DT for EVA cluster requires two types of links: network and storage. The first requirement is at least two network links between the servers. MSCS uses the first network link as a dedicated private connection to pass heartbeat and cluster configuration information between the servers. The second network link is a public network connection that clients use to communicate with the cluster nodes. The DT cluster configuration can use any network card that is supported by Microsoft® operating systems. However, MSCS requires that the dedicated private link and public link between the servers be located on different TCP/IP subnets.

Because typical network topologies, such as 100-Mb Ethernet, cannot normally meet this criterion over the longer distances used in a DT cluster, another topology, such as FDDI or FCIP, must be used. FDDI network cards can be used in each server in place of the standard Ethernet NICs, or standard Ethernet NICs can be used to connect to an FDDI concentrator/FCIP switch that will connect the two sites.

The second requirement is the storage link between the storage subsystems. The servers are connected to the local storage systems, using multimode fiber optic cable. Each storage subsystem is connected to two Fibre Channel switches at each site in a redundant path configuration using multimode fiber optic cable. The switches at one site are connected to the switches at the other site by means of single-mode fiber optic or FCIP connections.

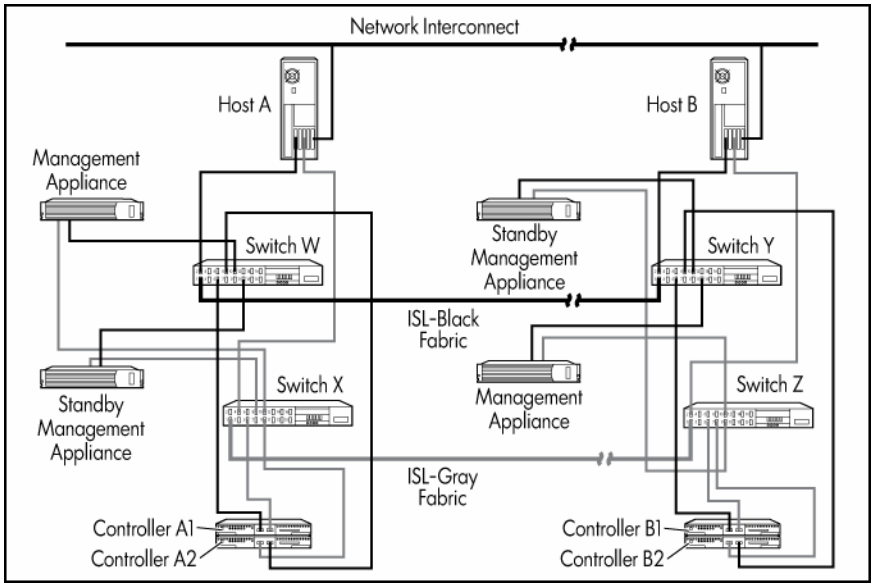
EVA basic DT configuration

The basic DT configuration includes a second destination storage subsystem that mirrors the data on the source storage subsystem. The basic DT configuration consists of:

- Two ProLiant servers as cluster nodes
- Two storage subsystems
- Four HP StorageWorks Fibre Channel SAN switches (for a current list of supported switches, refer to the High Availability website) (http://www.hp.com/servers/proliant/highavailability)

- Two FCAs in each server
- Two storage management appliances, at least one for each site

A basic DT cluster configuration consists of two separated nodes. The two nodes, plus the source storage subsystem, form an MSCS cluster.



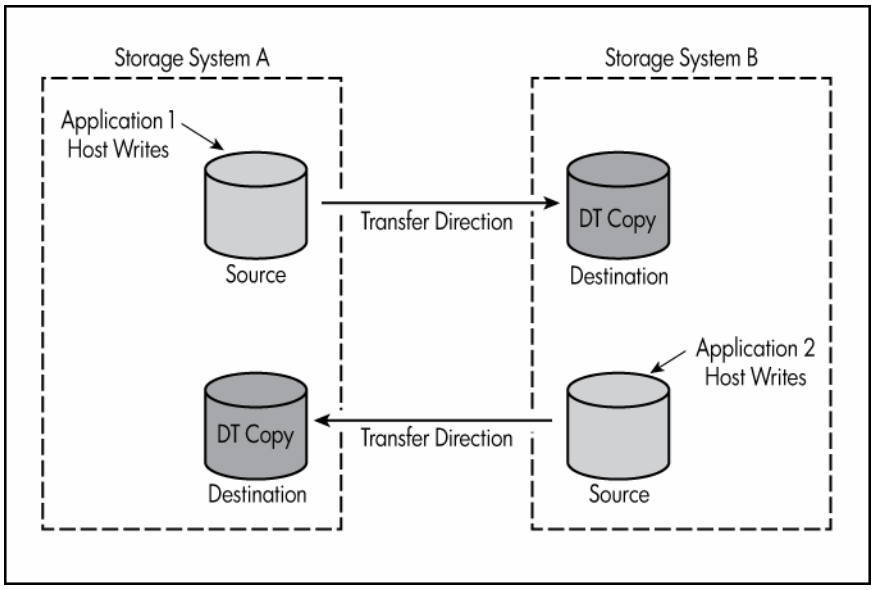
EVA bidirectional DT configuration

The bidirectional DT configuration enables a source subsystem to also be configured as a destination subsystem. The bidirectional DT configuration consists of:

- Two ProLiant servers as cluster nodes
- Two storage subsystems
- Four HP StorageWorks Fibre Channel switches
- Two FCAs in each server
- Two SMAs, at least one for each site

NOTE: Refer to the HP StorageWorks Continuous Access EVA Design Reference Guide for complete lists of supported equipment.

A bidirectional DT configuration consists of two separated nodes. As in the basic DT configuration, data at the first site is mirrored on a second storage subsystem at the second site. Two storage systems can communicate bidirectionally, meaning that a storage system can be used as the primary source for data and as a destination for data replication. By providing redundant systems and software, as well as alternate paths for data flow, high availability and disaster tolerance is achieved with no single point of failure.



EVA maximum DT configuration

Refer to the High Availability website (http://www.hp.com/servers/proliant/highavailability) or HP StorageWorks Continuous Access EVA Design Reference Guide for maximum configuration information.

Setting up the ProLiant Cluster F500 for Enterprise Virtual Array

In this section

Required materials

To configure an F500 DT cluster for Continuous Access, you will need any applicable documents listed in the "Related Documents" section of the *HP Continuous Access EVA Getting Started Guide*. Many of the referenced documents will be online.

The following is a short list of essential documents.

- *HP Continuous Access EVA Getting Started Guide*
- *HP ProLiant Cluster F500 Installation Guide*
- HP StorageWorks Continuous Access EVA Design Reference Guide
- *HP StorageWorks Continuous Access User Interface Installation Guide*
- *HP StorageWorks Continuous Access User Interface Release Notes*
- HP StorageWorks Command View EVA documentation, including online help
- HP StorageWorks Continuous Access Management User Interface online help
- HP StorageWorks Secure Path for Windows installation guide
- Fibre Channel SAN Switch installation and hardware guide

Continuous access

Refer to the *HP StorageWorks Continuous Access EVA Operations Guide* for detailed information on Continuous Access, including any restrictions.

Installing the hardware

Depending on the size of your SAN and the considerations used in designing it, many different hardware configurations are possible. Refer to the HP StorageWorks Continuous Access Enterprise Virtual Array Design Reference Guide for a detailed description of various hardware configurations.

Set up the cluster using the following procedures:

1. "Preparing the F500 for continuous access EVA hardware installation (on page 10)"
2. "Setting up the servers (on page 10)"

3. "Setting up the storage subsystem (on page 10)"
4. "Setting up the Fibre Channel adapters (on page 10)"
5. "Setting up the Fibre Channel switches at both locations, if applicable (on page 11)"
6. "Connecting the controllers to the switches (on page 11)"
7. "Connecting the host to the switches (on page 13)"
8. "Zoning recommendations (on page 13)"
9. "Setting Up a Bidirectional Solution (on page 13)"

Preparing the F500 for continuous access EVA hardware installation

Task	Reference document
Set up EVA storage system hardware.	*HP StorageWorks Enterprise Virtual Array User Guide*
Make fabric connections: • Connect GBICs or small form factor pluggables to switch ports. • Connect HSV controller pair, SMA, and hosts to Fibre Channel fabrics. • Test intersite links.	• *HP StorageWorks Continuous Access EVA Operations Guide* • *Compaq SANworks Management Appliance Getting Started Guide*
Install intersite links and connect to switches with GBICs or SFPs.	*HP StorageWorks SAN Extension Using FCIP Configuration Guide*
Install host kits and device drivers, if required. Upgrade drivers if necessary.	OS-specific kit version 3.x for EVA installation and configuration guide
Install Fibre Channel adapters.	FCA documentation
Create separate management zones for any HSG80 systems in your SAN.	*HP StorageWorks SAN Design Reference Guide*
Plan and populate layout of one or more physical disk groups.	*HP StorageWorks Continuous Access EVA Operations Guide*
Power up storage systems and SMAs.	• *HP ProLiant Cluster F500 Installation Guide* • *Compaq SANworks Management Appliance Getting Started Guide*

Setting up the servers

To prepare the Continuous Access solution for setup, refer to the ProLiant cluster documentation. Follow the installation instructions in the ProLiant server documentation.

Setting up the storage subsystem

Refer to the documentation that was shipped with the storage subsystem for detailed installation instructions.

Setting up the Fibre Channel adapters

Two FCAs must be installed on each host. For detailed installation instructions, refer to the documentation that comes in the host kit or with your adapter.

Locate and record the World Wide Names of each FCA on the zoning worksheet. Keep a copy of the worksheets at all your sites. In addition, record the WWNs for the EVA and the SMAs for each site.

NOTE: The WWN can be found on the bottom of the adapter board. Look for a small bar code label with an IEEE precursor. A WWN example is 1000-0000-C920-A5BA.

Setting up the Fibre Channel switches at both locations, if applicable

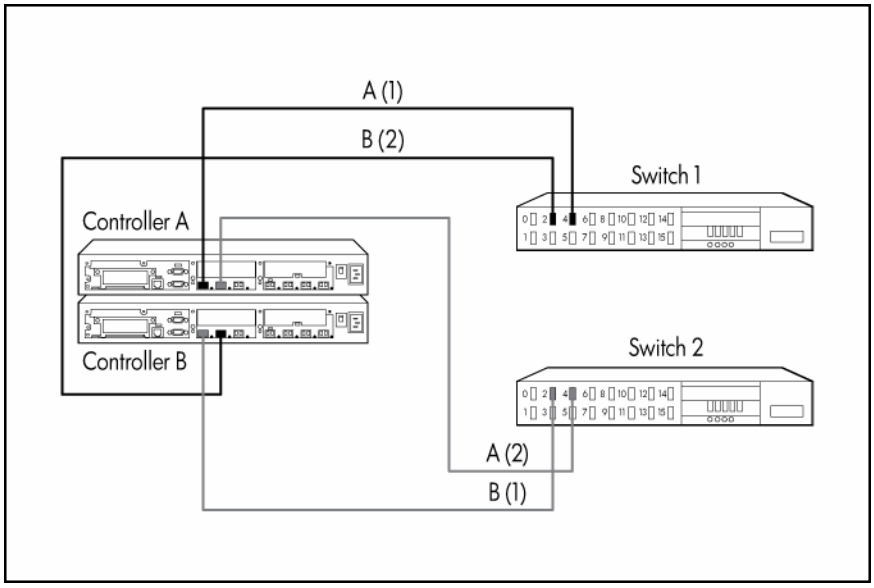
NOTE: Both Fibre Channel switches can be configured from the same site.

Your Fibre Channel switches must be installed and configured with two working redundant fabrics before you connect the remaining Continuous Access EVA components to your fabrics. For information on the specific switches used and GBICs needed, refer to the HP website (http://h18006.www1.hp.com/storage/saninfrastructure.html).

Connecting the controllers to the switches

Before connecting fiber optic cables between storage components, HP recommends that you tag each end to identify switch names, port numbers, controller names, and so on.

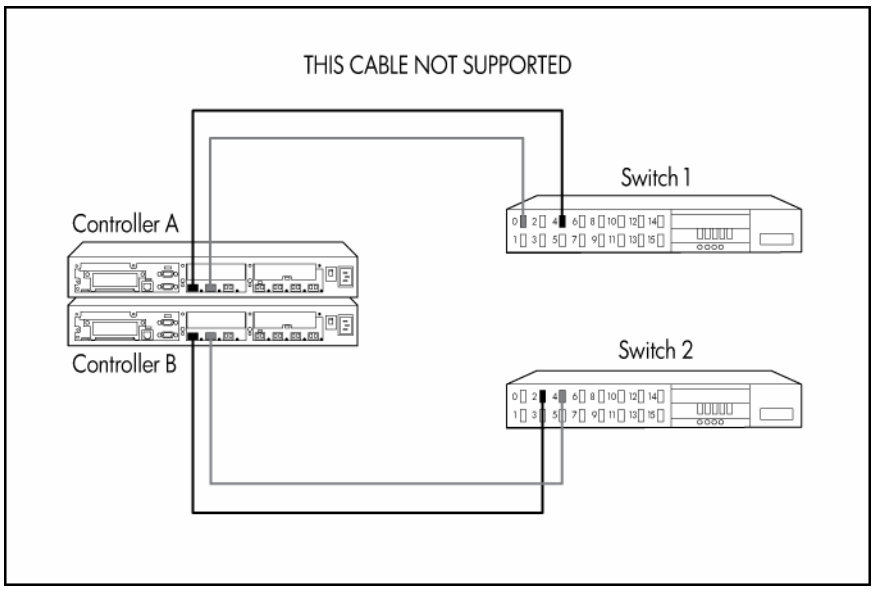
Four fiber optic cable connections are required for each controller pair. The only supported connection scheme is shown below. Connect the fiber optic cable such that port 1 of controller A and controller B go to different fabrics. Connect port 2 of controller A and controller B to separate fabrics that are the fabric opposite from port 1 on that controller.



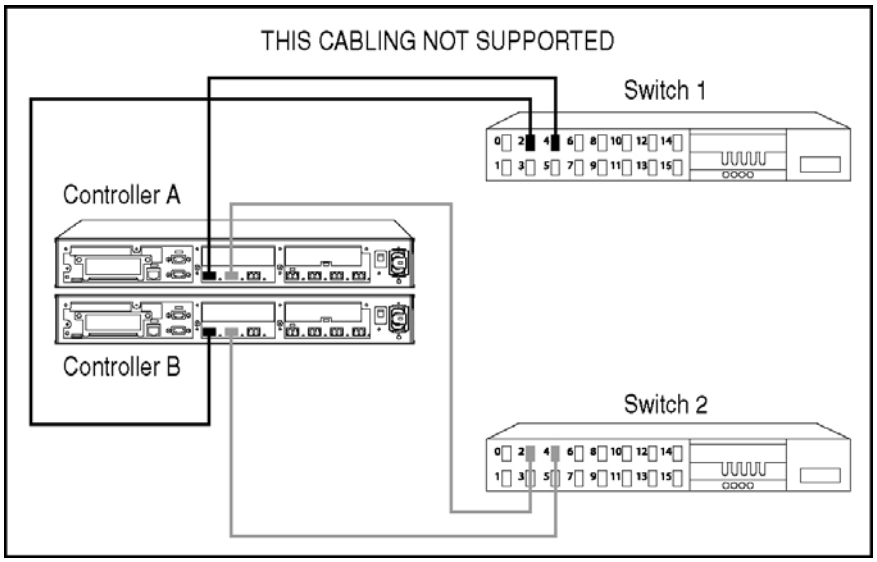
The basic rule is that the first or left-hand port on the top controller is cabled to the first fabric and the other port of the same controller is cabled to the other fabric. The other (bottom) controller is cabled such that the left-hand port is attached to the second fabric, while the second port is cabled to the first fabric, the opposite of the first (top) controller. Even though it does not matter which switch ports are used, symmetry is recommended.

Either controller can be controller A or controller B. In a storage system that has not been configured, the first controller that powers up and passes a self-test becomes controller A. Also, under certain conditions, controller A and controller B can have their designations reversed.

Any other controller-to-fabric cabling scheme is not supported. The cabling in the following example is not supported because both port 1s share the same fabric and both port 2s share the same fabric.



The cabling in the following example is not supported because both ports of a controller are on the same fabric, limiting failover options when there is a fabric issue.



You can control the power sequence of the controllers in your storage system, thereby forcing a controller designation. To guarantee that a particular controller is designated controller A:

1. Uninitialize the storage system. If it is a new storage system that has never been initialized, this step is not necessary.
2. Power off both controllers.
3. Pull out and reseat the cache batteries on the controller you want to designate controller A. This procedure clears the cache.
4. Power up that controller.
5. After controller A passes the self-test, power up the other controller.

Connecting the host to the switches

Tag each end of your fiber optic cable to identify switch names, port numbers, host names, and so on. Two fiber optic connections are required for each host. Connect the fiber optic cable such that connections to the two FCAs go to two separate switches (fabrics).

Zoning recommendations

Having both fabrics in place and operational is necessary before you even begin any other equipment installation. For information on fabric topologies, fabric design rules, and switch zoning, refer to the *HP StorageWorks SAN Design Reference Guide.*

For Continuous Access-specific guidelines, refer to the *HP StorageWorks Continuous Access EVA Operations Guide.*

Zoning is a logical grouping of end-to-end Fibre Channel connections, implemented by switches, to create a barrier between different environments and allow for finer segmentation of the fabric. Switch ports that are members of a zone can communicate with each other but are isolated from ports in other zones.

Because the SMA and hosts in a Continuous Access EVA environment can conflict with each other, they must reside in separate zones.

NOTE: If any HSG80 controllers with DRM reside within the SAN, they must be zoned out of an EVA fabric.

Setting up a bidirectional solution

You can configure data replication groups to replicate data from storage system A to storage system B and other unrelated data replication groups to replicate data from storage system B back to storage system A. This feature, called *bidirectional replication,* enables a storage system to have both source and destination virtual disks, where these Vdisks belong to separate Data Replication groups. This setup has no effect on normal operation or failover policy and has the advantage of allowing for the destination storage system to be actively used while also providing a disaster-tolerant copy of the other site's data. If the business needs require bidirectional data transfers, you must determine the effect on the links.

Refer to the Continuous Access EVA Design Reference Guide for more information.

Configuring the software

The storage system must be initialized before it can be used. This process binds the controllers together as an operational pair and establishes preliminary data structures on the disk array.

Initialization is performed through the use of the Command View EVA. This procedure is documented in the *HP StorageWorks Command View EVA Getting Started Guide.* HP StorageWorks Command View EVA maintains a database that resides on the management appliance and is accessible only by the element manager for each storage system.

The Command View EVA software can be installed on more than one management appliance in a fabric. Each installation of the Command View EVA software is a management agent. The client for the agent is a standard browser.

To begin the configuration process, create, or initialize, the storage system. When you first view the EVA from the Command View EVA software, the storage pool is presented as "uninitialized storage."

Before the host servers can use the virtual disks, you must:

- Initialize the storage systems at both the source and destination. The storage pool is "uninitialized storage" at the outset.

- Add hosts to the storage system.
- Create and present virtual disks to hosts.

Configure the software using the following procedures:

1. "Preparing the F500 for Continuous Access EVA Software Installation (on page 14)"
2. "Logging On to the SAN Management Appliance (on page 15)"
3. "Entering a License Key (on page 15)"
4. "Initializing the Source Site (on page 15)"
5. "Naming the Site (on page 15)"
6. "Creating the VD Folders (on page 16)"
7. "Creating the VDs (on page 16)"
8. "Creating the Host Folder (on page 17)"
9. "Adding a Host (on page 17)"
10. "Presenting the VDs to the Host (on page 17)"
11. "Discovering the Devices (on page 18)"
12. "Creating the DR Groups (on page 18)"
13. "Creating the Copy Sets (on page 18)"
14. "Creating the Managed Sets (on page 19)"
15. "Pre-presenting the Destination VDs to Cluster Nodes (on page 19)"

Preparing the F500 for continuous access EVA software installation

Task	Reference document
Install latest version of system software: • HP OpenView Storage Management Appliance Software • HP StorageWorks Virtual Controller Software	*HP OpenView Storage Management Appliance Software User Guide* EVA Read Me First EVA Release Notes HP StorageWorks system software for EVA installation card HP StorageWorks upgrade instructions for EVA
Install HP StorageWorks Secure Path for Windows® for your platform.	HP StorageWorks Secure Path for Windows® platform-specific installation guide
Install HP StorageWorks Continuous Access User Interface.	*HP StorageWorks Continuous Access User Interface Installation Guide*
Enter storage system WWN into controller using the Operator Control Panel.	HP ProLiant Cluster F500 DT Installation Guide
Configure one switch zone encompassing the active SMA and all storage systems.	*HP StorageWorks SAN Design Reference Guide, 4th Edition* *Compaq StorageWorks Switch Zoning Reference Guide*
Configure one switch zone for each operating system/host and the storage systems.	*HP StorageWorks SAN Design Reference Guide, 4th Edition* *Compaq StorageWorks Switch Zoning Reference Guide*
Install Command View EVA and set up agents and user options.	*HP StorageWorks Command View EVA Getting Started Guide*

Logging on to the SAN management appliance

1. Log on to the management appliance by opening a browser and accessing the management appliance remotely by entering the IP address (or the network name if a DNS is configured) as the URL. The logon screen opens.
2. Click **anonymous.**
3. Log in as administrator.
4. Enter the password for the account.
5. Click **OK.** The hp openview storage management appliance window displays.

Entering a license key

You must enter a license key encoded with the WWN of the storage system before you initialize the storage system.

Follow the "Obtaining a License Key" instructions in the *HP StorageWorks Enterprise Virtual Array Licensing Guide.*

Each license key belongs to a specific WWN, so enter a license key that matches the WWN of the storage system. You can enter the license keys for all storage systems that this management agent will control at the same time.

NOTE: The WWN number must be entered exactly as it appears on the label. This field is case-sensitive. License keys require an ASCII text editor to ensure their format.

To enter a license key:

1. Click **Agent Options** in the Session pane. The Management Agent Options window displays.
2. Click **Licensing Options.** The Licensing Options window displays.
3. Click **Enter new license key.** The Add a License window displays.
4. Enter the license key.

   You must enter the license key exactly as it was in the e-mail you received from the license key fulfillment website. If possible, copy the license key from the e-mail and paste it into the text field.
5. Click **Add license.** The license key is added.
6. To enter additional license keys, repeat steps 4 and 5.

Initializing the source site

The procedures to initialize the source site are as follows:

Using the Command View EVA

- Naming the site
- Creating the VD folder
- Creating the Host folder
- Creating the Disk group folder

Using the Continuous Access GUI

- Creating the DR Group folder

Naming the site

In the hp openview storage management appliance window:

1. Click **Devices.** The Devices window displays.

2. Click **command view eva.** The HSV Storage Network Properties window displays. You can now browse the EVAs in the Uninitialized Storage System in the navigation panel.
3. Determine which site is to be designated Site A and which is to be designated Site B by selecting **Hardware>Controller Enclosure.** The Initialize an HSV Storage System window displays.
4. Enter any requested license key information. Refer to "Entering a license key (on page 15)."
5. In the Step 1: Enter a Name field, enter the site name.
6. In the Step 2: Enter the number of disks field, enter the maximum number of disks (minimum of eight in a disk group) or the number of disks you will use in the default disk group.

NOTE: You must determine if you will configure your storage in a single disk group or multiple disk groups.

CAUTION: Do not use the browser **Back** button because you will undo the previous operation.

7. Select **Advanced Options** to set up the clock.

IMPORTANT: Set up the clock on both EVAs to pull time from the same source.

8. Click **Next.** Request a disk failure protection level.

NOTE: HP recommends selecting double for disk failure protection.

9. Click **Finish,** and then click **OK** (if the operation was successful).

NOTE: If the operation is not successful, it typically is caused by a communication problem. Verify the SAN connection, fix the problem, and begin again at step 1.

Creating the VD folders

1. In the Command View EVA navigation pane, click **Virtual Disks.** The Create a Folder window displays.
2. In the Step 1: Enter a Name field, enter the folder name (use the cluster name).
3. In the Step 2: Enter comments field, enter any additional information.
4. Select **Finish>OK.**

Creating the VDs

You are given the opportunity to select a preferred path during the creation of a Vdisk. This means that host I/O to a Vdisk will go to the controller you designate as preferred, as long as the paths to that controller are available. There are five possible preferred path settings. However, the Windows® environment enables only those shown in the bulleted list, as Secure Path is responsible for supporting failback capability.

NOTE: For path A and B, all members of a DR group must have the same preferred path.

- None (not recommended)
- Path A—Failover only
- Path B—Failover only

1. In the Command View EVA navigation pane, click the new VD folder. The Create a Vdisk Family window displays.
2. In the Vdisk name: field, enter the VD name.
3. In the Size: field, enter the size in gigabytes.
4. In the Preferred path/mode: dropdown menu, make a selection (for load balancing).

NOTE: All members of DR group must have same setting.

5. Click **Create More** and repeat steps 2 through 4 for each VD you create.
6. Select **Finish>OK.**

NOTE: The Continuous Access software will create the Site B VDs.

Creating the host folder

Create a host folder for each cluster to enable ease of administration.

1. Click **Create Folder.** The Create a Folder window displays.
2. In the Step 1: Enter a Name field, enter SiteA or any name up to 32 characters long.
3. In the Step 2: Enter comments field, enter any additional information, up to 64 characters long.
4. Select **Finish>OK.**
5. Repeat steps 1 through 4 for all remaining clusters.

Adding a host

NOTE: If the SAN appliance cannot see the host WWNs, perform steps 1 and 2. Otherwise, begin at step 3.

1. Reboot the SAN appliance.
2. Access the Command View EVA application.
3. Click the desired host in the navigation pane. The Add a Host window displays.
4. In the Host name: field, enter the host name.
5. In the Host IP address: dropdown menu, select the appropriate scheme or enter the IP address if it is a static IP address.
6. In the Port WW Name: dropdown menu, select a port WWN for the first FCA.
7. Click **Add Host,** and then click **OK.** The Add a Host Port window displays.
8. For each FCA:
   a. In the Click to select from list dropdown menu, select the appropriate FCA.
   b. Click **Add port.**
9. Select the **Ports** tab (which displays only after selecting to add the port) and verify the ports are correctly assigned.
10. Repeat the procedure for Site B.

Presenting the VDs to the host

CAUTION: Shut down all the nodes. Only one node should see the drives at one time.

1. In the Command View EVA navigation pane, click the first new VD. The Vdisk Active Member Properties window displays.
2. Click **Presentation.** The Vdisk Active Member Properties window displays.
3. Click **Present.** The Present Vdisk window displays.
4. Select both hosts, and then click **Present Vdisk.**
5. Click **OK.** You are returned to the Vdisk Active Members Property window.
6. Select the **Presentation** tab to verify that both hosts are on the same LUN. The Vdisk Active Members Property window displays.
7. Repeat steps 1 through 6 for each VD.

8. Power on Node 1.
9. Log on to the domain.
10. Wait until all the VDs are discovered.
11. Open the operating system Device Manager and look at that disk drive.
12. Go to the operating system Disk Manager and select **Initialize, do not upgrade to dynamic disk.**
13. Format the disk and label the volumes.
14. Install MSCS on Node 1. Refer to the appropriate documentation.
15. Repeat steps 8 through 14 for Node 2.
16. Join Node 2 to the cluster.

Discovering the devices

You will be creating the copy sets and DR groups in the same sequence.

1. In the HP OpenView Storage Management Appliance window, click **Tools.**
2. Click **continuous access.** The Continuous Access Status window displays. The window is empty.

NOTE: You are now working in the Continuous Access user interface, not the Command View EVA.

3. Click **Refresh>Discover.** A pop-up window informs you that the discovery process could be lengthy.

After the system has discovered the devices, you will create the DR groups and copy sets.

NOTE: You must plan how to separate managed sets and copy sets. Refer to the *HP StorageWorks Continuous Access EVA Operations Guide.*

Creating the DR groups

You can create the DR groups first or create the initial copy set, which forces the DR group creation process.

The following procedure is for creating the DR groups before the copy sets.

1. On the Continuous Access window, select the site from the navigation pane.
2. Click **Create>DR Group.** The Create a new DR Group window opens.
3. In the DR Group: field, enter the name.
4. In the Destination Storage System: dropdown list, select the destination site.
5. In the Comments: field, enter any comments.
6. Click **Next.**
7. Select **Finish>OK.**
8. Repeat the procedure for each DR group.

Creating the copy sets

NOTE: Entering the first copy set will force the DR group creation sequence if no DR Group has yet been created.

1. On the Continuous Access window, select the site from the navigation pane.
2. Click **Create>Copy Set.** The Create a new Copy Set window opens.
3. In the DR Group: dropdown list, select the DR group to which the copy set will belong.

4. In the Copy Set: field, enter the copy set name.
5. Select the source VD from the Source Virtual Disk: dropdown list.
6. Enter the DR Group.
7. Select the destination from the Destination Storage System: dropdown list (Site B, if you have followed suggested naming conventions).
8. Click **Finish**.

Creating the managed sets

A managed set is a folder created to hold DR groups. One or more DR groups can be combined to create a managed set.

1. Choose **Create>Managed Sets.** The Edit or create a Managed Set window displays.
2. In the Managed Set Name: field, enter the name.
3. Click **Finish.**
4. Repeat the procedure for each managed set to create.
5. In the navigation pane, select the first DR group to be part of a managed set.
6. In the Configuration dropdown menu, select **Edit.** The Edit an existing DR Group window displays.
7. Select a managed set from the Managed Set list, and then click **Finish.**
8. Repeat steps 5 through 7 for each DR group to add.

Pre-presenting the destination VDs to cluster nodes

1. In the hp openview storage management appliance window, select **Devices.** The Devices window displays.
2. Click **command view eva.** The command view eva Properties window opens.
3. In the navigation pane, select the destination subsystem, and then click **Virtual Disks.**
4. Select the virtual disk to present on the destination subsystem.
5. Select **Active.** The Vdisk Active Member Properties window displays.
6. Select the **Presentation** tab, and then click **Present.** The Present Vdisk window opens.
7. Select the VDs, and then click **Present Vdisk.**
8. Click **OK.**
9. Repeat for each VD to present.
10. Verify the disks are properly presented.
    a. In the navigation pane, select the host to verify.
    b. Select the **Presentation** tab. The Host Properties window displays.
    c. Verify that each VD is presented to a unique LUN.

The configuration is complete.

HP ProLiant Cluster F500 for MA8000 Enhanced DT overview

In this section

HP ProLiant Cluster F500 for MA8000 introduction

This guide provides supplemental information for setting up an HP ProLiant Cluster F500 DT for MA8000 configuration, and it is a link between the various clustering guides needed to complete a DT cluster installation. These guides include the following:

- Data Replication Manager HSG80 ACS operations guide
- StorageWorks HSG80 Array Controller ACS configuration guide
- StorageWorks HSG80 Array Controller CLI reference guide
- *HP ProLiant Cluster F500 Installation Guide*

This guide includes additional installation instructions and references to these guides to complete the setup of an F500 DT for MA8000 cluster.

Disaster tolerance for MA8000

Disaster-tolerant solutions provide high levels of availability with rapid data access recovery, no single point of failure, and continued data processing after the loss of one or more system components in a cluster configuration. Data is simultaneously written to both local and remote sites during normal operation. The local site is known as the initiator site because it is in control of the operation. The remote site is known as the target site because it is where the information is copied.

Copied data resides at both the initiator and target sites. However, in base DT cluster configurations under normal conditions, host data access occurs only through the initiator site. Processing will migrate to the target site and continue normal operation if a component failure or a catastrophe occurs at the initiator site.

HP ProLiant Cluster F500 for MA8000 overview

The HP ProLiant Cluster F500 DT for MA8000 configuration is a two-node cluster for Windows® 2000 Advanced Server. The DT configurations use HP ProLiant servers, StorageWorks storage subsystems, StorageWorks Data Replication Manager software, and StorageWorks Secure Path software.

This solution combines the failover functionality of Microsoft® Cluster Server with the remote data mirroring functionality of DRM. This solution also allows for a distance of up to 100 km between the server nodes and between a primary (local) external storage subsystem and a mirrored (remote) external storage subsystem. The server-to-storage connection is based on a Fibre Channel switch using a shortwave connection and server-to-server communication using Ethernet over FDDI or ATM connections.

The HP ProLiant server nodes in the cluster are connected or stretched over a distance. Up to two storage subsystems for ATM connections and four storage subsystems for non-ATM connections can be used at one site. These storage subsystems act as the initiator sites for the DRM software and process disk subsystem requests for all nodes in the cluster. The storage subsystems are connected to the server nodes by means of redundant Fibre Channel connections that are managed by Secure Path. Additionally, the initiator storage subsystems are connected by means of redundant longwave fiber/ATM connections to the target site. As with standard HP ProLiant Clusters using Microsoft® operating systems, MSCS manages failovers at the server and application levels.

The DRM software functions at the redundant storage controller level in each of the storage subsystems and performs synchronous mirroring from the initiator site to the target site, creating an exact copy of the cluster-shared disk. A manual recovery process performed at the target site enables access to the mirrored data in the event of a disaster at the initiator site. The cluster is functional again within minutes, and application processing can continue.

The F500 DT for MA8000 cluster requires two types of links: network and storage. The first requirement is for at least two network links between the servers. MSCS uses the first network link as a dedicated private connection to pass heartbeat and cluster configuration information between the servers. The second network link is a public network connection that clients use to communicate with the cluster nodes. The DT cluster configuration can use any network card that is supported by Microsoft® operating systems. However, MSCS requires that the dedicated private link and public link between the servers be located on the same TCP/IP subnet.

Because typical network topologies, such as 100 Mb Ethernet, cannot normally meet this criterion over the longer distances used in a DT cluster, another topology, such as FDDI or ATM must be used. FDDI network cards can be used in each server in place of the standard Ethernet NIC cards, or standard Ethernet NICs can be used to connect to an FDDI concentrator/ATM switch that will connect the two sites. This type of configuration supports the longer distances used in a DT cluster and meets the requirement for keeping the servers on the same TCP/IP subnet.

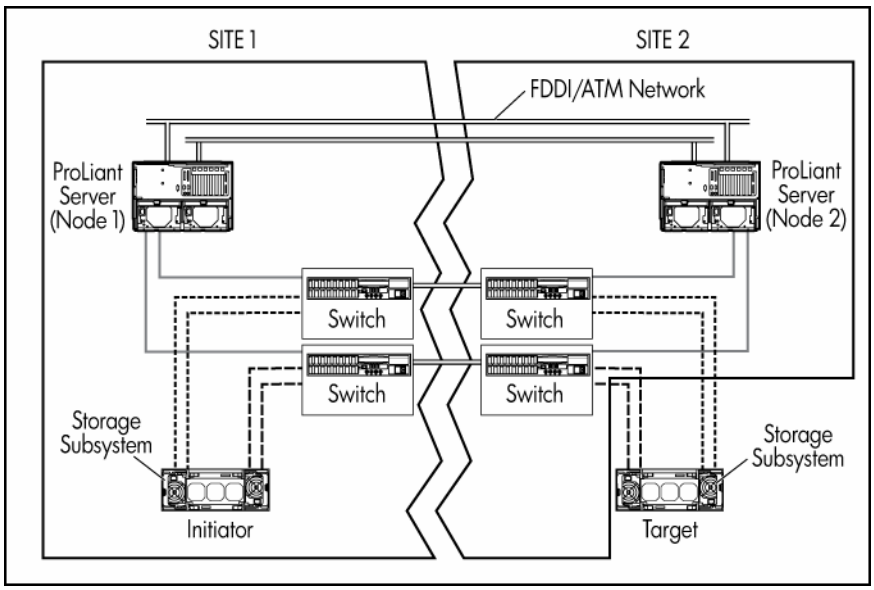
The second requirement is the storage link between the storage subsystems. The servers are connected to the local storage systems using multimode fiber optic cable. Each storage subsystem is connected to two Fibre Channel switches at each site in a redundant path configuration using multimode fiber optic cable. The switches at one site are connected to the switches at the other site by means of single-mode fiber optic or ATM connections.

MA8000 basic DT configuration

The basic DT configuration includes a second target storage subsystem that mirrors the data on the initiator storage subsystem. The basic DT configuration consists of:

- Two HP ProLiant servers as cluster nodes
- Two storage subsystems
- Four StorageWorks Fibre Channel SAN Switch 8/8-EL or SAN Switch 16/16-EL switches
- Two host bus adapters in each server
- Two storage controllers in each storage subsystem

A basic DT configuration consists of two separated nodes. The two nodes plus the initiator storage subsystem form an MSCS cluster.

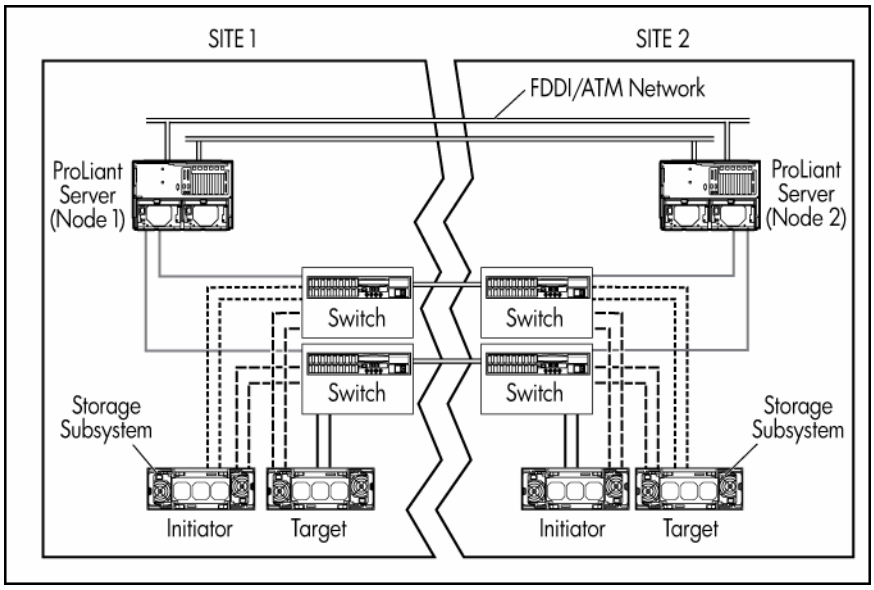


MA8000 bidirectional DT configuration

The bidirectional DT configuration adds two storage subsystems to the basic DT configuration. The bidirectional DT configuration consists of:

- Two HP ProLiant servers as cluster nodes
- Four storage subsystems
- Four StorageWorks Fibre Channel SAN Switch 8/8-EL or SAN Switch 16/16-EL switches
- Two host bus adapters in each server
- Two storage controllers in each storage subsystem

A bidirectional DT configuration consists of two separated nodes. As in the basic DT configuration, data at the first site is mirrored on a second storage subsystem at the second site. The bidirectional DT solution adds an initiator storage subsystem at the second site. This storage subsystem is mirrored at the first site on a fourth storage subsystem (a target site). The first initiator-target pair of storage subsystems mirrors data from the first site to the second site, while the second initiator-target pair of storage subsystems mirrors data from the second site to the first site.



MA8000 maximum DT configuration

Refer to the High Availability website (http://www.hp.com/servers/proliant/highavailability) for maximum configuration information.

Setting up the ProLiant Cluster F500 for MA8000

In this section

Required materials

To configure an F500 DT cluster for DRM, you will need the following guides:

- *HP ProLiant Cluster F500 Installation Guide*
- Data Replication Manager HSG80 ACS operations guide
- StorageWorks HSG80 Array Controller ACS configuration guide
- StorageWorks HSG80 Array Controller ACS maintenance and service guide
- StorageWorks HSG80 Array Controller ACS CLI reference guide
- StorageWorks Command Console getting started guide
- StorageWorks Secure Path for Windows installation guide
- Fibre Channel SAN Switch installation and hardware guide

Data Replication Manager

Refer to the Data Replication Manager HSG80 ACS operations guide for detailed information on the Data Replication Manager including any restrictions.

Installing the hardware

Set up the cluster using the following procedures:

1. "Setting up the servers for MA8000 (on page 25)"
2. "Setting up the storage subsystem (on page 10)"
3. "Setting up the host bus adapters (on page 25)"
4. "Designating the server as a maintenance terminal (on page 25)"
5. "Setting up the Fibre Channel switches at both locations (on page 25)"

Setting up the servers for MA8000

Refer to the Data Replication Manager HSG80 ACS operations guide for DRM installation information needed to get the DRM solution ready for setup.

Follow the installation instructions in the HP ProLiant server documentation to set up each server as a stand-alone server, and then follow the instructions in the following sections to configure the cluster.

Setting up the storage subsystem

Refer to the documentation that was shipped with the storage subsystem for detailed installation instructions.

Setting up the host bus adapters

Install two host bus adapters into the host server to run the DRM solution. Refer to the host bus adapter guide for detailed information on this hardware.

Locate and record the WWN of each host bus adapter on the Connection naming worksheet (on page 53). This number will be needed when renaming the host connections later in the installation process.

NOTE: The WWN can be found on the bottom of the adapter board. Look for a small bar code label with an IEEE precursor. A WWN example is 1000-0000-C920-A5BA.

Designating the server as a maintenance terminal

A server must be connected to the storage controller to provide a maintenance terminal.

NOTE: Only one server should be designated as the maintenance terminal. It is recommended that a separate stand-alone server that is not part of the cluster be designated as the maintenance server.

1. Connect the RJ-12 connector on the communications cable to the maintenance port on the storage controller.
2. Connect the 9-pin serial connector on the communications cable to either the COM1 or COM2 port on the server.

NOTE: Record which serial port is used. This information will be needed when setting up the communications program and configuring the controller.

Setting up the Fibre Channel switches at both locations

Refer to the documentation that was shipped with the switches for detailed switch installation instructions. To set up the Fibre Channel switches at both locations:

1. Turn on the AC power for each switch.
2. Enter the IP addresses and subnet masks for each switch. Each switch must have a different IP address.

Configuring DRM

A command line interface must be present on both the target and initiator sites before you begin the configuration process. Refer to the Data Replication Manager HSG80 ACS operations guide for detailed DRM configuration instructions.

Set up DRM using the following procedures:

1. "Configuring the Controllers at the Target Site (on page 26)"
2. "Configuring the Storage at the Target Site (on page 29)"
3. "Connecting Fiber Optic Cables Between the Controllers and Switches (on page 29)"
4. "Connecting the Target Site to the External Fiber Link (on page 29)"
5. "Connecting the Target Site to the ATM Link (on page 30)"
6. "Configuring the Host at the Target Site (on page 30)"
7. "Configuring the Controllers at the Initiator Site (on page 31)"
8. "Configuring the Storage at the Initiator Site (on page 34)"
9. "Connecting Fiber Optic Cables Between the Controllers and Switches (on page 29)"
10. "Connecting the Initiator Site to the External Fiber Link (on page 35)"
11. "Connecting the Initiator Site to the ATM Link (on page 35)"
12. "Creating Remote Copy Sets (on page 35)"
13. "Creating Log Units and Association Sets (Optional) (on page 36)"
14. "Configuring the Host at the Initiator Site (on page 37)"

Configuring the controllers at the target site

Before configuring the controllers at the target site:

- Identify the WWN on each host bus adapter and document it on the Connection Naming Worksheet for later use.
- Establish the name for the target site. Use a naming convention that is meaningful, such as building or city names (for example, SiteA for the initiator site and SiteB for the target site).

To get the DT system up and running you must first set up and configure the controllers. To set up and configure the controllers:

1. Power off all the storage subsystems, Fibre Channel switches, PDUs, and the main power supply.
2. Plug all cabinet PDU power cords into the main power receptacles.
3. Apply power to the main power source.

NOTE: Be sure that there is a serial connection to each of the controllers.

4. Turn on all PDUs.
5. Be sure that the Fibre Channel switches are powered up but not cabled.
6. Power on the storage subsystems. (This refers to RA8000/ESA12000 storage subsystems.)

NOTE: The controllers will boot when the storage subsystems are powered up if the PCMCIA program cards are already installed. If there are no cards in the controller slots, insert them now, and press the reset button. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for complete instructions on properly seating the controller cards.

7. Establish a local connection to the controller. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for instructions.
8. Verify that all controllers are turned on and functional by looking for the CLI prompt on the maintenance port terminal.

NOTE: All operations can be conducted from either controller.

9. Enter the following command:
   `SHOW THIS_CONTROLLER`

10. Verify that the storage subsystem WWN, also called the NODE_ID, is set. The WWN is not set if zeros are displayed. Go to step 14 if the WWN is set. If the WWN has not been assigned to the controller, obtain the WWN and continue with step 11.

CAUTION: Data corruption occurs if two subsystems are set to the same WWN.

NOTE: The storage subsystem WWN and checksum can be found on a sticker located on top of the frame that houses the controllers, EMU, PVA, and cache modules. This sticker also includes a checksum that verifies that the WWN is valid. Contact a customer service representative for assistance if the sticker is missing. Refer to the StorageWorks HSG80 Array Controller ACS configuration guide for more information on WWNs. Each subsystem WWN begins with 5000 and ends in zero, for example 5000-1FE1-FF0C-EE00. The controller port IDs are derived from the WWN.

11. Assign the WWN to the controller by entering the following command:
    ```
    SET THIS NODE_ID=node_ID checksum
    ```
12. Restart the controller by entering the following command:
    ```
    RESTART THIS_CONTROLLER
    ```

NOTE: A series of %LFL, %CER, and %EVL messages are displayed when the controller restarts. These messages indicate a Last Failure Log, a CLI Event Report, and an Event Log. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for a complete explanation of these event messages.

13. Use a SHOW THIS command to verify that the WWN has been set.
14. Configure the controllers for multibus failover mode by entering the following command:
    ```
    SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER
    ```
    This command automatically restarts the other controller. A series of %LFL and %EVL messages are displayed. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for more details on these messages.
15. Be sure that the setting from step 14 has been applied by entering the following command:
    ```
    SHOW THIS_CONTROLLER FULL
    ```
    The output shows that the controllers have been configured to support multibus failovers.

NOTE: The multibus failover settings are automatically applied to controller B.

16. Verify that the settings have been accepted on controller B by entering the following command:
    ```
    SHOW OTHER_CONTROLLER FULL
    ```
17. Change the controller prompts to help identify which controller is in use by entering the following commands:
    ```
    SET THIS_CONTROLLER PROMPT="TargetControllerNameTop"
    SET OTHER_CONTROLLER PROMPT="TargetControllerNameBottom"
    ```

NOTE: The commands used in this step assume the maintenance cable is connected to the top controller port.

18. Verify the SCSI Version and the Command Console LUN settings by entering the following command:
    ```
    SHOW THIS_CONTROLLER
    ```
    It is recommended to use SCSI-3 so that the CCL is always enabled. The CCL is required for scripting failover and failback procedures. For more information on scripting, refer to the Data Replication Manager HSG80 ACS scripting user guide.

    Set the SCSI Version to SCSI-3 by entering the following command:
    ```
    SET THIS_CONTROLLER SCSI_VERSION=SCSI-3
    ```
19. Verify that the settings established for controller A have been applied to controller B by entering the following command:
    ```
    SHOW OTHER_CONTROLLER
    ```

20. Check to see if the mirrored write-back cache is enabled by entering the following command:
    ```
    SHOW THIS_CONTROLLER
    ```
    If the mirrored write-back cache is not enabled, enter the following command:
    ```
    SET THIS_CONTROLLER MIRRORED_CACHE
    ```
    The controllers will restart after the mirrored write-back cache has been set, and you will see a series of %LFL and %EVL messages.
21. Confirm that the mirrored write-back cache is enabled (after the controllers restart) by entering the following command:
    ```
    SHOW THIS_CONTROLLER
    ```
    Notice that the mirrored write-back cache is now set. It is not necessary to repeat this step on controller B.

NOTE: It might take up to five minutes after the controller restarts to complete the cache check. The controllers will reject this command until the cache check is complete. Do not restart the controllers if this command is rejected. Wait a few minutes and then retry.

The storage subsystem is ready to operate when the Reset LED indicator on the storage controller flashes at a rate of one time per second.

22. Set the time on the storage subsystems by entering the following command:
    ```
    SET THIS_CONTROLLER TIME=DD-MMM-YYYY:HH:MM:SS
    ```
23. Set both of the cache battery expiration dates. Perform the following:
    a. While connected to the top controller, type in run frutil and press **Enter.**
    b. Type **Y** and press **Enter** when the prompt to replace this controller cache battery displays.
    c. Ignore the instructions to replace the battery and press **Enter.**
    d. Connect the maintenance cable to the bottom controller.
    e. Type in run frutil and press **Enter.**
    f. Repeat steps b and c for the bottom controller. Both cache battery expiration dates are now set.
    g. Connect the maintenance port to the top controller and press **Enter** to display a prompt.
24. Set the fabric topology for each port on both controllers by entering the following commands:
    ```
    SET THIS_CONTROLLER PORT_1_TOPOLOGY=FABRIC
    SET THIS_CONTROLLER PORT_2_TOPOLOGY=FABRIC
    SET OTHER_CONTROLLER PORT_1_TOPOLOGY=FABRIC
    SET OTHER_CONTROLLER PORT_2_TOPOLOGY=FABRIC
    ```
25. Verify that the topology is set correctly by entering the following commands:
    ```
    SHOW THIS_CONTROLLER
    SHOW OTHER_CONTROLLER
    ```
26. Enable the DRM by entering the following command:
    ```
    SET THIS_CONTROLLER REMOTE_COPY=TargetNodeName
    ```

NOTE: Specify a meaningful NodeName, such as a name that reflects the site location. Do not use "local" and "remote;" these are reserved keywords. The name can be up to eight characters and must be unique to all your controllers. Refer to the StorageWorks HSG80 Array Controller ACS configuration guide for naming guidelines.

A series of %LFL and %EVL messages are displayed, and the controllers automatically restart after entering the CLI command.

27. Verify that these settings are correct by entering the following command:
    ```
    SHOW THIS_CONTROLLER
    ```

Configuring the storage at the target site

Add disks, create the storagesets, and create units before configuring the storage for DRM. Refer to the StorageWorks HSG80 Array Controller ACS configuration guide for instructions. Keep in mind the restrictions specific to this installation where noted.

IMPORTANT: The target site and the initiator site must have exactly the same storageset and unit configuration.

NOTE: If using SWCC, at least one LUN defined on the storage subsystem that is not part of a remote copy set is required.

To configure the storage after all the units have been created:

1. Disable access on all units by entering the following command:
   ```
   SET UnitNumber DISABLE_ACCESS_PATH=ALL
   ```
2. Verify that the access on each unit is set to None by entering the following command:
   ```
   SHOW UNITS FULL
   ```
3. Repeat steps 1 and 2 for each unit.
4. Verify that the unit settings are correct by entering the following command:
   ```
   SHOW UNITS FULL
   ```
5. Enter the following commands to distribute the units by setting their preferred path:
   ```
   SET UnitNumber PREFERRED_PATH=THIS_CONTROLLER
   SET UnitNumber PREFERRED_PATH=OTHER_CONTROLLER
   ```

Connecting fiber optic cables between the controllers and switches

To establish fiber optic connections:

1. Connect a multimode fiber optic cable from port 1 of the top controller to port 2 of the top Fibre Channel switch.
2. Connect a second multimode fiber optic cable from port 2 of the top controller to port 4 of the top Fibre Channel switch.
3. Connect a third multimode fiber optic cable from port 1 of the bottom controller to port 2 of the bottom Fibre Channel switch.
4. Connect a fourth multimode fiber optic cable from port 2 of the bottom controller to port 4 of the bottom Fibre Channel switch.

IMPORTANT: If "PORT_1_TOPOLOGY = FABRIC (point-to-point)" is displayed, it indicates a switch configuration error. Consult the switch documentation to correct this problem.

NOTE: A green LED indicator on the switch illuminates as soon as the cable is inserted at both ends. This verifies that there is a good connection.

Connecting the target site to the external fiber link

Locate the connection points linking the target site to the initiator site. Look for either a fiber optic cable connector or a patch panel to insert the cable.

To connect the target site to the external fiber link:

1. Connect a single-mode fiber optic cable pair from port 6 of the top switch to one connection point.
2. Connect another single-mode fiber optic cable pair from port 6 of the bottom switch to the other connection point.

The target site is now physically linked to the initiator site.

Connecting the target site to the ATM link

Locate the connection points linking the target site to the initiator site. To connect the target site to the ATM link:

1. Connect a multimode fiber optic cable from port 6 of the first switch to PCI number 1 on the first Open Systems Gateway box.
2. Connect a multimode fiber optic cable from port 6 of the second switch to PCI number 1 on the second OSG box.

Refer to the *SANworks Data Replication Manager Over an ATM Link Application Note* for information on completing the connection to the ATM link.

Configuring the host at the target site

Configure the target site host to complete the target site configuration. Perform the following:

1. "Installing the host bus adapters and drivers (on page 30)"
2. "Verifying StorageWorks Fibre Channel software installation (on page 30)"
3. "Installing Secure Path (on page 30)"
4. "Installing StorageWorks Command Console (on page 30)" (optional)
5. "Connecting fiber optic cables between the hosts and switches (on page 30)"
6. "Renaming the host connections at the target site (on page 31)"

Installing the host bus adapters and drivers

Install two host bus adapters in each host system to run DRM. Refer to the host bus adapter documentation for installation information.

Verifying StorageWorks Fibre Channel software installation

Verify that StorageWorks Fibre Channel software is installed. Go to the **Add/Remove** Programs screen to verify.

Installing Secure Path

Refer to the Secure Path documentation for detailed instructions for installing Secure Path Software.

Installing StorageWorks Command Console

Installing SWCC is optional. Refer to the StorageWorks Command Console getting started guide for SWCC installation instructions.

Connecting fiber optic cables between the hosts and switches

To connect the fiber optic cables between the host and switches:

1. Connect the first multimode fiber optic cable from port 0 of the top switch to one adapter on a host.
2. Connect the second multimode fiber optic cable from port 0 of the bottom switch to the other adapter on the same host.

IMPORTANT: Choose any available port to connect the cable, but maintain the identical scheme at the initiator site. For example, if port 1 of controller B is connected to port 2 of the bottom switch at the target site, then port 1 of controller B must be connected to port 2 of the bottom switch at the initiator site.

3. If you have more than one host, connect one host bus adapter to one of the remaining ports on the top switch. Connect the other host bus adapters to the same numbered ports on the bottom switch.

   The host is now connected to the target site switches by means of the multimode fiber optic cables.

4. Verify that the connection between the host and switches has been made by entering the following command:
   ```
   SHOW CONNECTIONS
   ```

NOTE: Verify that a connection has been made by looking for a solid-green LED indicator on the switch ports.

Renaming the host connections at the target site

Rename the host connections using a meaningful connection name to help identify which hosts are in use. Each host bus adapter is displayed as a connection. An individual host bus adapter is identified by its WWN, which is displayed in the connection description.

The default name for each connection is !NEWCONxx. Change the connection name for each connection to something meaningful and easy to remember.

Use the Connection Naming Worksheet when renaming the host connections. Fill in the fields accordingly to prepare for renaming the connections.

To rename the host connections:

1. Rename the connections by entering the following commands:
   ```
   RENAME !NEWCONxx TargetHostConnectionNamex
   RENAME !NEWCONxx TargetHostConnectionNamey
   ```
2. View the new settings after renaming the host connections by entering the following command:
   ```
   SHOW CONNECTIONS
   ```

Configuring the controllers at the initiator site

Before configuring the controllers at the initiator site:

- Identify the WWN on each host bus adapter and document it on the Connection Naming Worksheet for later use.
- Establish the name for the initiator site. Use a naming convention that is meaningful, such as building or city names (for example, SiteA for the initiator site and SiteB for the target site).

To get the DT system up and running you must first set up and configure the controllers. To set up and configure the controllers:

1. Power off all the storage subsystems, Fibre Channel switches, PDUs, and the main power supply.
2. Plug all cabinet PDU power cords into the main power receptacles.
3. Apply power to the main power source.

NOTE: Be sure that there is a serial connection to each of the controllers.

4. Turn on all PDUs.
5. Be sure that the Fibre Channel switches are powered up but not cabled.
6. Power on the storage subsystems. (This refers to RA8000/ESA12000 storage subsystems.)

NOTE: The controllers will boot when the storage subsystems are powered up if the PCMCIA program cards are already installed. If there are no cards in the controller slots, insert them now, and press the reset button. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for complete instructions on properly seating the controller cards.

7. Establish a local connection to the controller. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for instructions.
8. Verify that all controllers are turned on and functional by looking for the CLI prompt on the maintenance port terminal.

NOTE: All operations can be conducted from either controller.

9. Enter the following command:
   `SHOW THIS_CONTROLLER`
10. Verify that the storage subsystem WWN, also called the NODE_ID, is set. The WWN is not set if zeros are displayed. Go to step 14 if the WWN is set. If the WWN has not been assigned to the controller, obtain the WWN and continue with step 11.

CAUTION: Data corruption occurs if two subsystems are set to the same WWN.

NOTE: The storage subsystem WWN and checksum can be found on a sticker located on top of the frame that houses the controllers, EMU, PVA, and cache modules. This sticker also includes a checksum that verifies that the WWN is valid. Contact a customer service representative for assistance if the sticker is missing. Refer to the StorageWorks HSG80 Array Controller ACS configuration guide for more information on WWNs. Each subsystem WWN begins with 5000 and ends in zero, for example 5000-1FE1-FF0C-EE00. The controller port IDs are derived from the WWN.

11. Assign the WWN to the controller by entering the following command:
    `SET THIS NODE_ID=node_ID checksum`
12. Restart the controller by entering the following command:
    `RESTART THIS_CONTROLLER`

NOTE: A series of %LFL, %CER, and %EVL messages are displayed when the controller restarts. These messages indicate a Last Failure Log, a CLI Event Report, and an Event Log. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for a complete explanation of these event messages.

13. Use a SHOW THIS command to verify that the WWN has been set.
14. Configure the controllers for multibus failover mode by entering the following command:
    `SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER`

    This command automatically restarts the other controller. A series of %LFL and %EVL messages are displayed. Refer to the StorageWorks HSG80 Array Controller ACS maintenance and service guide for more details on these messages.
15. Be sure that the setting from step 14 has been applied by entering the following command:
    `SHOW THIS_CONTROLLER FULL`

    The output shows that the controllers have been configured to support multibus failovers.

NOTE: The multibus failover settings are automatically applied to controller B.

16. Verify that the settings have been accepted on controller B by entering the following command:
    `SHOW OTHER_CONTROLLER FULL`
17. Change the controller prompts to help identify which controller is in use by entering the following commands:
    ```
    SET THIS_CONTROLLER PROMPT="InitiatorControllerNameTop"
    SET OTHER_CONTROLLER PROMPT="InitiatorControllerNameBottom"
    ```

NOTE: The commands used in this step assume the maintenance cable is connected to the top controller port.

18. Verify the SCSI Version and the Command Console LUN settings by entering the following command:
    `SHOW THIS_CONTROLLER`

It is recommended to use SCSI-3 so that the CCL is always enabled. The CCL is required for scripting failover and failback procedures. For more information on scripting, refer to the Data Replication Manager HSG80 ACS scripting user guide.

Set the SCSI Version to SCSI-3 by entering the following command:

```
SET THIS_CONTROLLER SCSI_VERSION=SCSI-3
```

19. Verify that the settings established for controller A have been applied to controller B by entering the following command:

```
SHOW OTHER_CONTROLLER
```

20. Check to see if the mirrored write-back cache is enabled by entering the following command:

```
SHOW THIS_CONTROLLER
```

If the mirrored write-back cache is not enabled, enter the following command:

```
SET THIS_CONTROLLER MIRRORED_CACHE
```

The controllers will restart after the mirrored write-back cache has been set, and you will see a series of %LFL and %EVL messages.

21. Confirm that the mirrored write-back cache is enabled (after the controllers restart) by entering the following command:

```
SHOW THIS_CONTROLLER
```

Notice that the mirrored write-back cache is now set. It is not necessary to repeat this step on controller B.

NOTE: It might take up to five minutes after the controller restarts to complete the cache check. The controllers will reject this command until the cache check is complete. Do not restart the controllers if this command is rejected. Wait a few minutes and then retry.

The storage subsystem is ready to operate when the Reset LED indicator on the storage controller flashes at a rate of one time per second.

22. Set the time on the storage subsystems by entering the following command:

```
SET THIS_CONTROLLER TIME=DD-MMM-YYYY:HH:MM:SS
```

23. Set both of the cache battery expiration dates. Perform the following:
    a. While connected to the top controller, type in run frutil and press **Enter.**
    b. Type **Y** and press **Enter** when the prompt to replace this controller cache battery displays.
    c. Ignore the instructions to replace the battery and press **Enter.**
    d. Connect the maintenance cable to the bottom controller.
    e. Type in run frutil and press **Enter.**
    f. Repeat steps b and c for the bottom controller. Both cache battery expiration dates are now set.
    g. Connect the maintenance port to the top controller and press **Enter** to display a prompt.
24. Set the fabric topology for each port on both controllers by entering the following commands:

```
SET THIS_CONTROLLER PORT_1_TOPOLOGY=FABRIC
SET THIS_CONTROLLER PORT_2_TOPOLOGY=FABRIC
SET OTHER_CONTROLLER PORT_1_TOPOLOGY=FABRIC
SET OTHER_CONTROLLER PORT_2_TOPOLOGY=FABRIC
```

25. Verify that the topology is set correctly by entering the following commands:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

26. Enable the DRM by entering the following command:

```
SET THIS_CONTROLLER REMOTE_COPY=InitiatorNodeName
```

NOTE: Specify a meaningful NodeName, such as a name that reflects the site location. Do not use "local" and "remote;" these are reserved keywords. The name can be up to eight characters and must be unique to

all your controllers. Refer to the StorageWorks HSG80 Array Controller ACS configuration guide for naming guidelines.

A series of %LFL and %EVL messages are displayed, and the controllers automatically restart after entering the CLI command.

27. Verify that these settings are correct by entering the following command:
```
SHOW THIS_CONTROLLER
```

Configuring the storage at the initiator site

Add disks, create the storagesets, and create units before configuring the storage for DRM. Refer to the StorageWorks HSG80 Array Controller ACS configuration guide for instructions. Keep in mind the restrictions specific to this installation where noted.

IMPORTANT: The target site and the initiator site must have exactly the same storageset and unit configuration.

NOTE: If using SWCC, at least one LUN defined on the storage subsystem that is not part of a remote copy set is required.

To configure the storage after all the units have been created:

1. Disable access on all units by entering the following command:
```
SET UnitNumber DISABLE_ACCESS_PATH=ALL
```
2. Verify that the access on each unit is set to None by entering the following command:
```
SHOW UNITS FULL
```
3. Repeat steps 1 and 2 for each unit.
4. Verify that the unit settings are correct by entering the following command:
```
SHOW UNITS FULL
```
5. Enter the following commands to distribute the units by setting their preferred path:
```
SET UnitNumber PREFERRED_PATH=THIS_CONTROLLER
SET UnitNumber PREFERRED_PATH=OTHER_CONTROLLER
```

Connecting fiber optic cables between the controllers and switches

To establish fiber optic connections:

1. Connect a multimode fiber optic cable from port 1 of the top controller to port 2 of the top Fibre Channel switch.
2. Connect a second multimode fiber optic cable from port 2 of the top controller to port 4 of the top Fibre Channel switch.
3. Connect a third multimode fiber optic cable from port 1 of the bottom controller to port 2 of the bottom Fibre Channel switch.
4. Connect a fourth multimode fiber optic cable from port 2 of the bottom controller to port 4 of the bottom Fibre Channel switch.

IMPORTANT: If "PORT_1_TOPOLOGY = FABRIC (point-to-point)" is displayed, it indicates a switch configuration error. Consult the switch documentation to correct this problem.

NOTE: A green LED indicator on the switch illuminates as soon as the cable is inserted at both ends. This verifies that there is a good connection.

Connecting the initiator site to the external fiber link

Locate the connection points linking the target site to the initiator site. Look for either a fiber optic cable connector or a patch panel to insert the cable.

To connect the initiator site to the external fiber link:

1. Connect a single-mode fiber optic cable pair from port 6 of the top switch to one connection point.
2. Connect another single-mode fiber optic cable pair from port 6 of the bottom switch to the other connection point.

The initiator site is now physically linked to the target site.

Connecting the initiator site to the ATM link

Locate the connection points linking the initiator site to the target site. To connect the initiator site to the ATM link:

1. Connect a multimode fiber optic cable from port 6 of the first switch to PCI number 1 on the first OSG box.
2. Connect a multimode fiber optic cable from port 6 of the second switch to PCI number 1 on the second OSG box.

Refer to the *SANworks Data Replication Manager Over an ATM Link Application Note* for information on completing the connection to the ATM link.

Creating remote copy sets

Remote copy sets must be created from both the initiator and the target site.

From the target site

To create remote copy sets from the target:

1. Create the connections between the target and initiator sites before creating the remote copy set by entering the following command:
   ```
   ADD REMOTE RCS199 D199 InitiatorName\D199
   ```

NOTE: Although this command will fail, it creates and names the connections appropriately.

2. Verify that the target has access to the initiator controller by entering the following command:
   ```
   SHOW CONNECTIONS
   ```
3. The target units must allow access to the controllers at the initiator site. Enable access to the controllers by entering the following commands:
   ```
   SET UnitName ENABLE_ACCESS_PATH=(InitiatorControllerConnectionA,
   InitiatorControllerConnectionB, InitiatorControllerConnectionC,
   InitiatorControllerConnectionD)
   ```
4. Repeat step 3 for each UnitName.

From the initiator site

Create the connections between the initiator and target sites before creating the remote copy set by entering the following command:

```
ADD REMOTE RCS199 D199 TargetName\D199
```

To create remote copy sets from the initiator site:

1. Verify that the initiator has access to the target controller by entering the following command:
   ```
   SHOW CONNECTIONS
   ```

2. The following CLI command creates remote copy sets. When this command is entered, the controllers copy all data from the initiator unit to the target unit. This process is called normalization.

   Create the remote copy sets by entering the following command:
   ```
   ADD REMOTE RemoteCopySetName InitiatorUnitName
   RemoteNodeName\TargetUnitName
   Example: ADD REMOTE RC_D1 D1 SITEBA\D1
   ```

NOTE: It is not necessary to repeat this step at the target site.

A %EVL message is displayed that includes the remote copy set information.

Creating log units and association sets (optional)

In the following example hypothetical disks 50100 and 60100 are used as the mirrorset for the log disk. The log unit is D10. The association set name is AS_D1. The association set is using remote copy set name RC_D1.

Creating a log unit

To create a log unit:

1. Create a mirrorset for the log disk by entering the following command:
   ```
   ADD MIRRORSET MirrorsetName DiskName
   Example: ADD MIRR MIR_D1LOG DISK50100 DISK60100
   ```
2. Initialize the mirrorset by entering the following command:
   ```
   INITALIZE ContainerName
   Example: INITIALIZE MIR_D1LOG
   ```
3. Verify that the mirrorset is created by entering the following command:
   ```
   SHOW MIRRORSET
   ```
4. Present the log storageset to the controller by entering the following command:
   ```
   ADD UNIT UnitNumber ContainerName
   Example: ADD UNIT D10 MIR_D1LOG
   ```
5. Verify that the controller recognizes the log unit by entering the following command:
   ```
   SHOW UNITS
   ```

Creating association sets and assigning a log unit

To create association sets and assign a log unit:

1. Create an association set by entering the following command:
   ```
   ADD ASSOCIATION AssociationSetName RemoteCopySetName
   Example: ADD ASSOCIATION AS_D1 RC_D1
   ```
2. Disable the node access to the log unit by entering the following command:
   ```
   SET UnitNumber DISABLE_ACCESS_PATH=ALL
   Example: SET D10 DISABLE_ACCESS_PATH=ALL
   ```
3. Disable the write-back cache by entering the following command:
   ```
   SET UnitNumber NOWRITEBACK_CACHE
   Example: SET D10 NOWRITEBACK_CACHE
   ```
4. Verify that the access and the write-back cache are disabled by entering the following command:
   ```
   SHOW UnitNumber
   ```
5. Assign the log unit to the association set by entering the following command:
   ```
   SET AssociationSetName LOG_UNIT=D10
   Example: SET AS_D1 LOG_UNIT=D10
   ```
6. Verify the status of the association set by entering the following command:
   ```
   SHOW AssociationSetName
   ```

```
Example: SHOW AS_D1
```

7. Add any additional remote copy sets to the association set by entering the following command:
   ```
   SET AssociationSetName ADD=RemoteCopySetName
   ```
8. Verify the status of the association set by entering the following command:
   ```
   SHOW AssociationSetName
   Example: SHOW AS_D1
   ```

Configuring the Host at the Initiator Site

Configure the initiator site host to complete the initiator site configuration. Perform the following:

1. "Installing the host bus adapters and drivers (on page 30)"
2. "Verifying StorageWorks Fibre Channel software installation (on page 30)"
3. "Installing Secure Path (on page 30)"
4. "Installing StorageWorks Command Console (on page 30)" (optional)
5. "Connecting fiber optic cables between the hosts and switches (on page 30)"
6. "Renaming the host connections at the initiator site (on page 38)"

Installing the host bus adapters and drivers

Install two host bus adapters in each host system to run DRM. Refer to the host bus adapter documentation for installation information.

Verifying StorageWorks Fibre Channel software installation

Verify that StorageWorks Fibre Channel software is installed. Go to the **Add/Remove** Programs screen to verify.

Installing Secure Path

Refer to the Secure Path documentation for detailed instructions for installing Secure Path Software.

Installing StorageWorks Command Console

Installing SWCC is optional. Refer to the StorageWorks Command Console getting started guide for SWCC installation instructions.

Connecting fiber optic cables between the hosts and switches

To connect the fiber optic cables between the host and switches:

1. Connect the first multimode fiber optic cable from port 0 of the top switch to one adapter on a host.
2. Connect the second multimode fiber optic cable from port 0 of the bottom switch to the other adapter on the same host.

IMPORTANT: Choose any available port to connect the cable, but maintain the identical scheme at the initiator site. For example, if port 1 of controller B is connected to port 2 of the bottom switch at the target site, then port 1 of controller B must be connected to port 2 of the bottom switch at the initiator site.

3. If you have more than one host, connect one host bus adapter to one of the remaining ports on the top switch. Connect the other host bus adapters to the same numbered ports on the bottom switch.

   The host is now connected to the target site switches by means of the multimode fiber optic cables.
4. Verify that the connection between the host and switches has been made by entering the following command:

```
SHOW CONNECTIONS
```

NOTE: Verify that a connection has been made by looking for a solid-green LED indicator on the switch ports.

Renaming the host connections at the initiator site

Rename the host connections using a meaningful connection name to help identify which hosts are in use. Each host bus adapter is displayed as a connection. An individual host bus adapter is identified by its WWN, which is displayed in the connection description.

The default name for each connection is !NEWCONxx. Change the connection name for each connection to something meaningful and easy to remember.

Use the Connection naming worksheet when renaming the host connections. Fill in the fields accordingly to prepare for renaming the connections.

To rename the host connections:

1. Rename the connections by entering the following commands:
   ```
   RENAME !NEWCONxx InitiatorHostConnectionNamex
   RENAME !NEWCONxx InitiatorHostConnectionNamey
   ```
2. View the new settings after renaming the host connections by entering the following command:
   ```
   SHOW CONNECTIONS
   ```
3. At the target site, the initiator host is displayed as new connections, !NEWCONxx. These should be renamed as described in steps 1 and 2.

Enabling access to the host at the initiator site

The initiator units need access to the hosts. To enable access to the hosts:

1. Shut down all nodes at the initiator site and the target site.
2. Enable access by entering the following commands:
   ```
   SET UnitName ENABLE_ACCESS_PATH=(InitiatorHostConnectionNamex,
   InitiatorHostConnectionNamey)
   ```

NOTE: There must be two paths per host. Repeat this sequence of steps for each host.

3. Bring up one node.

NOTE: Restart the server if you receive a message to do so.

4. Expand **Disk Drives** from the Device Manager utility. Count the number of drives, divide by 2, and the result should match the number of LUNs you configured.
5. Run the Disk Management utility to create partitions, format, and assign drive letters on the newly created storage.
6. Document the disk configuration and keep a copy at each site for later use.
7. Shut down the current node and repeat steps 3 through 7 for each remaining node.
8. Run Secure Path Manager by following this path:

   Start>Programs>Secure Path>SPM

   Start the application, and specify the preferred server and password. Select the **Save Password** box if the same password is used each time for logging in.
9. Verify the drives when the **Secure Path Manager** screen is displayed. Right-click the disk that needs verification and select **Properties.** The **Device Properties** window is displayed.

Installing Microsoft Cluster Server

Install MSCS on all cluster nodes.

1. Install MSCS on the first node and create the cluster.
2. Install MSCS on the remaining nodes and join the cluster.
3. Install applications.

Documenting the configuration

Keep a printed copy of the configuration for future reference. Update the records each time the configuration is modified. Follow the steps in the following section to obtain the status of the controllers, association sets, remote copy sets, units, and connections. Repeat the steps for the target site after obtaining this information for the initiator site.

Saving controller information

To save controller information, refer to the following sections.

- "Terminal emulator session (on page 39)"
- "SHOW commands (on page 39)"

Terminal emulator session

1. Use a laptop computer or another computer to communicate with the storage controller. Connect a serial cable between the COM port on that machine and the corresponding serial port on the storage controller.
2. Start a terminal emulator session. Settings to be used are: 9600 baud, 8 bits, No parity, 1 stop bit, NONE.

SHOW commands

1. View the complete information for the storage controller by entering the following command:
   `SHOW THIS_CONTROLLER FULL`
2. View the information for all association sets known to the controller pair by entering the following command:
   `SHOW ASSOCIATIONS FULL`
3. View information for all remote copy sets known to the controller pair by entering the following command:
   `SHOW REMOTE_COPY FULL`
4. View information for all units configured to the controller by entering the following command:
   `SHOW UNITS FULL`
5. View the connection name, operating system, controller, controller port, adapter ID address, online or offline status, and unit offset by entering the following command:
   `SHOW CONNECTIONS`

   Save this screen for future reference.
6. Repeat the steps under "Documenting the Configuration (on page 39)" for the target site.

Installing bidirectional storage

A bidirectional storage installation adds a second pair of storage subsystems. However, the target and initiator roles are reversed from that of the first pair of storage subsystems. Remote mirroring occurs in both directions with an initiator and target at each site.

Since the servers have already been configured with host bus adapters, cables, operating system, and software, configuring the additional storage subsystems is all that remains.

Repeat the steps in this section to configure the second pair of storage subsystems.

IMPORTANT: Remember that the roles of the target and initiator are reversed in bidirectional storage, so references to them are in the context of the additional pair of storage subsystems and will be the opposite of the first storage subsystem installation. For example, the target site during the installation of the first pair of storage subsystems is now the initiator site for the second pair.

For a bidirectional storage installation perform the following:

1. "Configuring the Controllers at the Target Site (on page 26)"

   This refers to the controllers in the newly added storage subsystem. Complete all these steps.
2. "Configuring the Storage at the Target Site (on page 29)"
3. "Connecting Fiber Optic Cables Between the Controllers and Switches (on page 29)"
4. "Configuring the Controllers at the Initiator Site (on page 31)"

   This refers to the controllers in the newly added storage subsystem. Complete all of these steps.
5. "Configuring the Storage at the Initiator Site (on page 34)"
6. "Connecting Fiber Optic Cables Between the Controllers and Switches (on page 29)"
7. "Creating Remote Copy Sets (on page 35)"
8. "Creating Log Units and Association Sets (Optional) (on page 36)"
9. "Enabling Access to the Host at the Initiator Site (on page 38)"

Adding clusters

The F500 DT cluster supports up to four clusters per set of four Fibre Channel switches, with one cluster node in each of the two locations.

NOTE: Sufficient storage space must be available to add clusters.

Each of the clusters can access storagesets consisting of disks in the existing storage subsystems. Although the different clusters can access a common set of storage subsystems, they cannot access the same storagesets within the storage systems. Access to each of the storagesets is enabled only for the cluster nodes for that cluster. Each cluster has exclusive access to its own storagesets but does not have access to storagesets belonging to the other clusters.

Because the storage subsystems have already been installed, all that remains is to install the additional servers and granting them access to their storagesets.

It is assumed that all of the storagesets, LUNs, and remote copy sets for this cluster have already been created.

NOTE: Refer to the StorageWorks HSG80 Array Controller ACS CLI reference guide for configuration information.

Installing server options

The F500 DT cluster requires two network links between the servers. The first network link is used by MSCS as a dedicated private connection to pass heartbeat and cluster configuration information between the two servers. The second network link is a public network connection that clients use to communicate with the two cluster nodes. The F500 DT cluster can use any network card that is supported by Windows® 2000.

MSCS does require that the dedicated private link between the two servers be located on the same TCP/IP subnet. Since typical network topologies, such as 100 Mb Ethernet, cannot normally meet this criterion over the longer distances used in a DT cluster, another topology, such as FDDI, must be used. FDDI network cards can be used in each server in place of the standard Ethernet NICs, or standard Ethernet NICs can be used to connect to a FDDI concentrator that will connect the two sites. This type of configuration supports the longer distances used in DT clusters while still meeting the requirement of keeping the servers on the same TCP/IP subnet.

To install server options in the servers:

1. Install at least two NIC interfaces in each server (one interface for cluster communication and one interface for client access).

NOTE: The NIC pairs across each location (dedicated-to-dedicated and public-to-public) on each server node must be on the same IP subnet.

2. Connect the NICs to the external fiber network link. This refers to the fiber link used for the network, which is a separate link from that used for the storage connections.
3. Install the operating system.

Configuring the host at the target site

Complete the following steps on the host server at the target site. This procedure configures the target host with the host bus adapters and associated drivers and software.

1. "Installing the host bus adapters and drivers (on page 30)"
2. "Verifying StorageWorks Fibre Channel software installation (on page 30)"
3. "Installing Secure Path (on page 30)"
4. "Installing StorageWorks Command Console (on page 30)" (optional)
5. "Connecting Fiber Optic Cables Between the Hosts and Switches (on page 30)"
6. "Renaming the Host Connections at the Target Site (on page 31)"

Configuring the host at the initiator site

Complete the following steps on the host server at the initiator site. This procedure configures the initiator host with the host bus adapters and associated drivers and software.

1. "Installing the host bus adapters and drivers (on page 30)"
2. "Verifying StorageWorks Fibre Channel software installation (on page 30)"
3. "Installing Secure Path (on page 30)"
4. "Installing StorageWorks Command Console (on page 30)" (optional)
5. "Connecting fiber optic cables between the hosts and switches (on page 30)"
6. "Renaming the host connections at the initiator site (on page 38)"
7. "Enabling access to the host at the initiator site (on page 38)"

IMPORTANT: Enable access to both connections for each of the cluster nodes.

Disaster recovery

In this section

HP ProLiant Cluster F500 DT for EVA

This section covers failover and failback scenarios that might occur with the HP ProLiant Cluster F500 DT for EVA configuration. Refer to the following sections for additional information.

Managing continuous access

Refer to the *HP Continuous Access EVA Operations Guide* (referred to in this section as the Continuous Access guide) for complete instructions on managing the Continuous Access software.

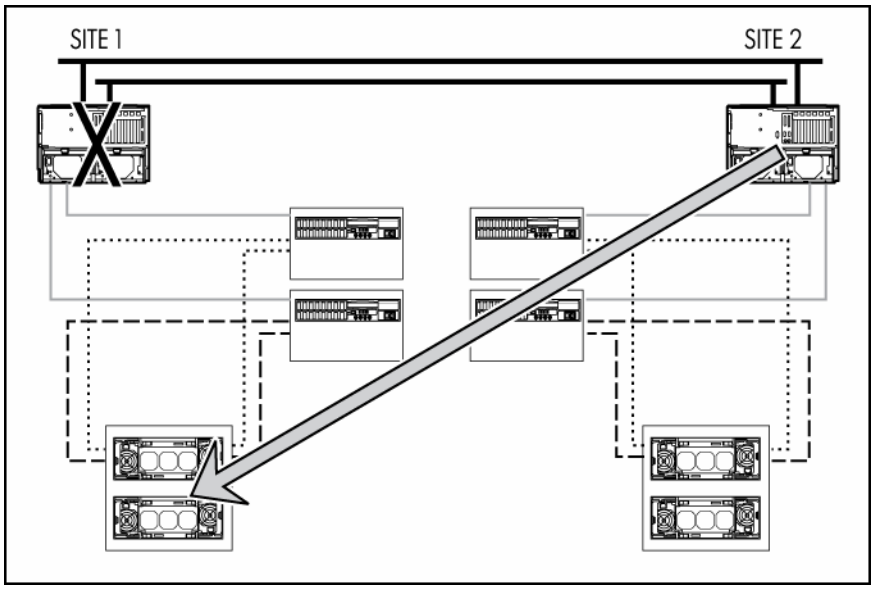
Failure scenarios

Additional information can be found in the "Monitoring Events" and "Failover" sections in the Continuous Access guide.

Resource failover

A cluster failover occurs if a cluster resource fails at one of the sites. The exact failover behavior can be configured for each cluster group, but usually this means that the entire cluster group that contains the failed resource might attempt to switch to the other cluster node. No storage subsystem failover is required in this scenario.

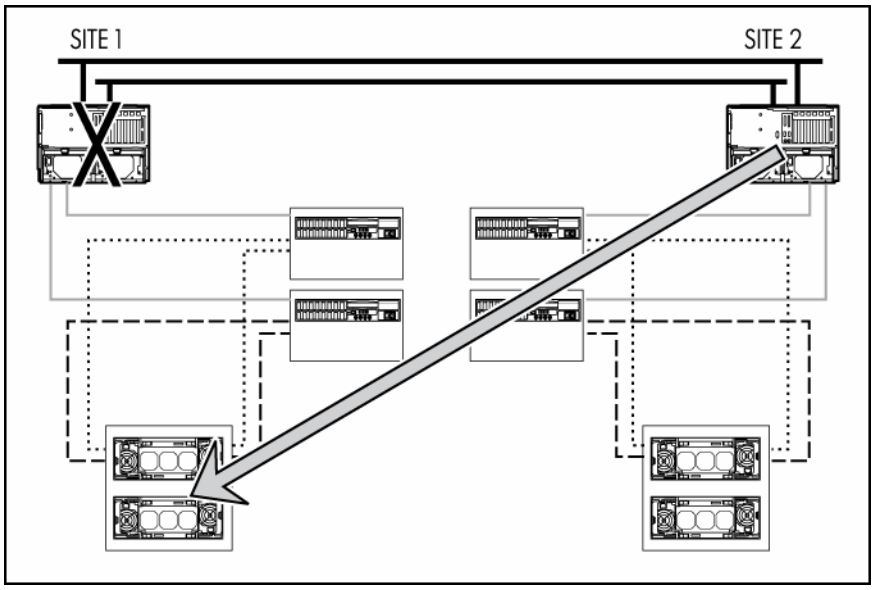
You are given the opportunity to select a preferred path during the creation of the Vdisks. This means that host I/O to a Vdisk will go to the controller you designate as preferred, as long as the paths to that controller are available. The two failover-only options available to Microsoft® Windows® platforms (failover-A and failover-B when you set up Vdisks) allow the host to control when a Vdisk moves to a preferred path. For example, if path A is preferred and that path becomes unavailable, path B is used. The host will then control the movement back to path A when it becomes available later.



Local server failure

A normal MSCS failover occurs if one of the cluster nodes fails. All of the resources defined in the cluster groups that were running on the failed node will attempt to switch over to the surviving nodes. As with a cluster resource failure, no storage subsystem failover is required. This is also the case when a cluster node is brought down for a scheduled event, such as system maintenance.

Use the standard failback mechanisms provided by MSCS after the failed server has been repaired or replaced. The server node automatically joins the cluster when the repaired server comes back online. The failback of each cluster group is determined by the failback policy that has been defined in MSCS for that group. Remove the failed server from the cluster before reinstalling the operating system if the server must be replaced. Then install MSCS and join it to the existing cluster. Fail back to the other server to perform a failback after a resource failure. There is no storage failback because there was no storage failover.



Source site failover

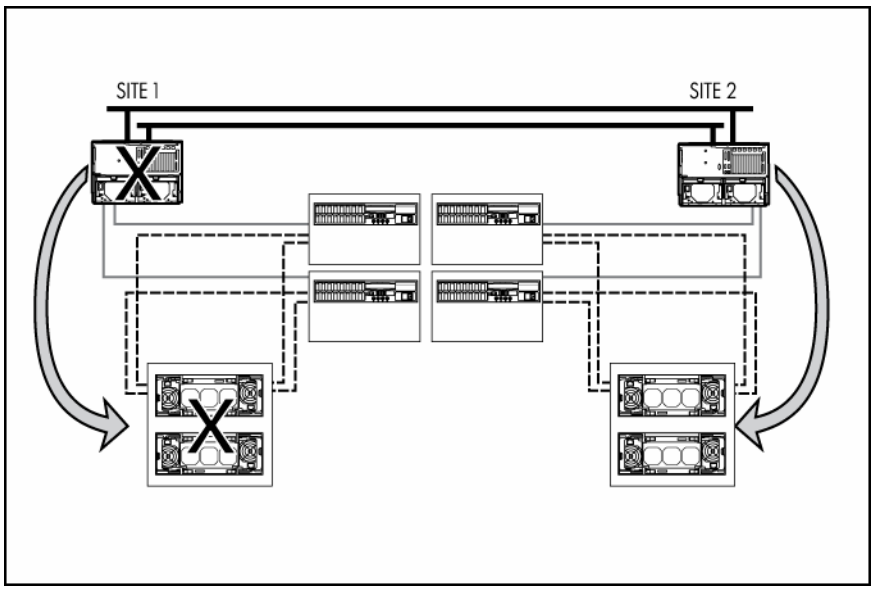
A small amount of downtime might occur if the Quorm disk is at the source site. The cluster is not available during this time until a site failover is performed.

Refer to the Continuous Access guide to determine the scenarios that warrant a failover.

There are two types of failover procedures to recover the remote copy sets: planned and unplanned. Use the planned failover procedure when failover is a scheduled event. Otherwise, use an unplanned failover procedure.

Refer to the Continuous Access guide for detailed instructions about both planned and unplanned failover procedures.

HP recommends the cluster nodes at the destination site be rebooted. However, depending on the SAN configuration, a rescan of the disks at the destination site can be attempted.



Source site failback

The two failover-only options for Vdisk creation enable the host to control when a Vdisk moves to a preferred path. For example, if path A is preferred and that path becomes unavailable, path B is used. The host will then control the movement back to path A when it becomes available later.

EVA storage failback procedure

Problem

EVA storage fails at one site requiring a site failover:

- Manual failover to the alternate site is successful.
- Cluster is successfully running on the alternate site.
- Investigate the source of the EVA storage problem at the original site and correct.
- During the boot process of the original storage subsystem, the cluster temporarily loses access to the disks that had to be failed over.
- Cluster loses the reservation of the disk and fails.
- Cluster requires a manual restart of the cluster service and manually brings the drives back online.

Solution

To overcome the disruption of cluster service during the recovery of the storage subsystem:

1. Disable the ISLs between the sites.

   Temporarily disable the ISLs between the sites so that host access can temporarily be removed from the original failed storage subsystem.
2. Restore power to the EVA storage at the failed site.
3. Power on the Storage Management Appliance at the failed site.
4. From the management appliance, at the failed site, remove access to the cluster for any disks that were failed over during the original site failover.
5. Be sure the cluster node at the failed site has been rebooted.

At this point the node at the failed site should show NO drives in Device Manager because the failed over drives have been unpresented.

Determine which management appliance you will continue to use. The management appliance at the failed site can be shutdown if you want to manage your storage system from the alternate site.

6. Restore the ISL links by enabling the switch ports (EPort).

   The EVA storage units will begin merging log data and negotiating state.

7. Re-present the failed-over disks to the cluster nodes on the failed EVA.

   The cluster is unaffected by the recovery process at this point.

NOTE: To minimize disruptions to the cluster, determine a good maintenance time to move the failed disks back to their original storage subsystem.

ISL failback procedure

Problem

Both ISLs fail requiring a site failover:

- All cluster resources continue unaffected on their respective storage arrays, but cluster moves cannot be performed.
- Manual failover to the alternate site is successful.
- Cluster is successfully running on the alternate site.
- Investigate the source of the ISL failures at the original site and correct.
- During the repair of the ISLs, the cluster temporarily loses access to the disks that had to be failed over.
- Cluster loses the reservation of the disk and fails.
- Cluster requires a manual restart of the cluster service and manually brings the drives back online.

Solution

To overcome the disruption of cluster service during the repair of the ISLs:

1. Access the management appliance at the destination site (site that was originally the primary site) and disable access to the cluster nodes for any of the disks that were failed over.
2. Repair the ISLs.

   The EVA storage units will begin merging log data and negotiating state.

3. Re-present the failed-over disks to the cluster nodes.

NOTE: To minimize disruptions to the cluster, determine a good maintenance time to move the failed disks back to their original storage subsystem.

HP ProLiant Cluster F500 DT for MA8000

This section covers failover and failback scenarios that might occur with the HP ProLiant Cluster F500 DT for MA8000 configuration. Refer to the following sections for additional information.

- "Managing Data Replication Manager (on page 47)"
- "F500 DT for MA8000 Failure Scenarios (on page 47)"
- "MSCS Resource Failover and Failback (on page 47)"
- "Local Server Failure (on page 43)"
- "Initiator Site Failover (on page 48)"

- "Initiator Site Failback (on page 49)"
- "Simple Failback Procedure for a Planned Failover (on page 49)"
- "Full Failback Procedure for an Unplanned Failover (on page 49)"

Managing Data Replication Manager

Refer to the Data Replication Manager HSG80 ACS operations guide (referred to in this section as the DRM guide) for complete instructions on managing the DRM.

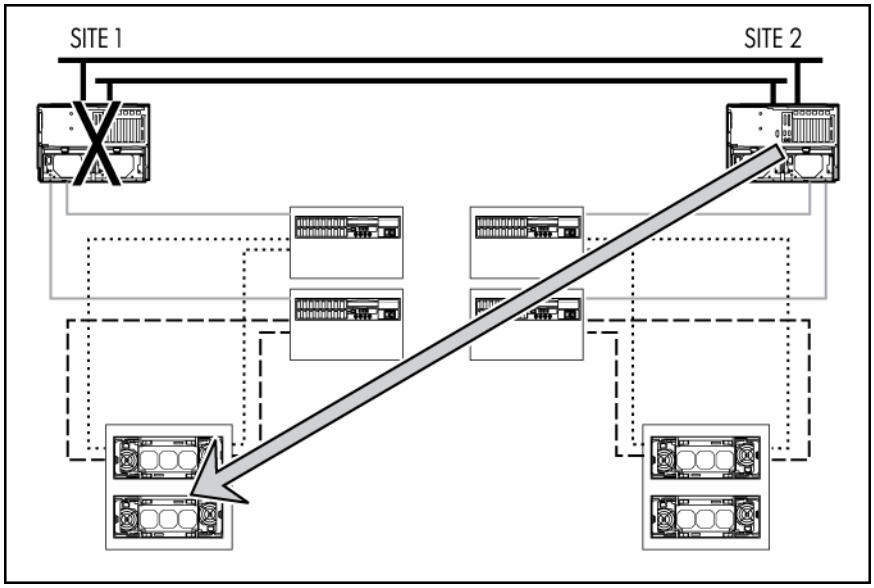
F500 DT for MA8000 failure scenarios

The F500 DT for MA8000 cluster uses MSCS software to provide automated failover and failback of applications, servers, and server resources. This provides an extra level of availability for applications.

MSCS resource failover and failback

A normal MSCS failover occurs if a cluster resource fails at the site. The exact failover behavior can be configured for each cluster group, but usually this means that the entire cluster group containing the failed resource might attempt to switch to the other cluster node. No storage subsystem failover is required in this situation.

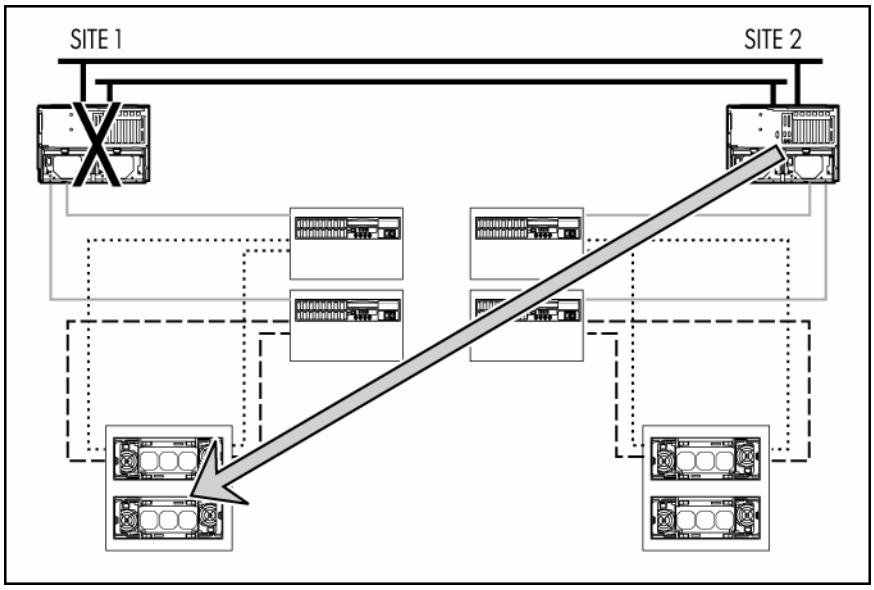
Use the standard failback mechanisms provided by MSCS to perform a failback after a resource failure. There is no storage failback in this situation because no storage subsystem failover occurred.



Local server failure

A normal MSCS failover occurs if one of the cluster nodes fails. All of the resources defined in the cluster groups that were running on the failed node will attempt to switch over to the surviving nodes. As with a cluster resource failure, no storage subsystem failover is required. This is also the case when a cluster node is brought down for a scheduled event, such as system maintenance.

Use the standard failback mechanisms provided by MSCS after the failed server has been repaired or replaced. The server node automatically joins the cluster when the repaired server comes back online. The failback of each cluster group is determined by the failback policy that has been defined in MSCS for that group. Remove the failed server from the cluster before reinstalling the operating system if the server must be replaced. Then install MSCS and join it to the existing cluster. Fail back to the other server to perform a failback after a resource failure. There is no storage failback because there was no storage failover.



Initiator site failover

A small amount of downtime occurs during a site failover. The cluster does not have access to any data or applications if the initiator storage system fails or is no longer available. The cluster is not available during this time.

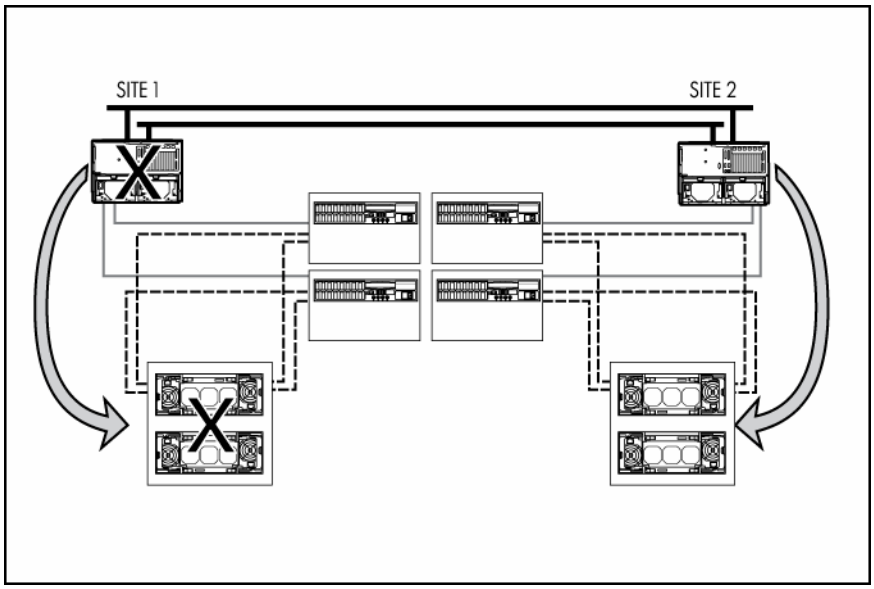
Refer to the DRM guide to determine the scenarios that warrant a failover.

There are two types of failover procedures to recover the remote copy sets: planned and unplanned. Use the planned failover procedure when failover is a scheduled event; otherwise, use an unplanned failover procedure.

Refer to the DRM guide for detailed instructions about both planned and unplanned failover procedures.

IMPORTANT: It is not necessary to reinstall the MSCS at the target site after a site failover is performed in an F500 DT configuration. Do **not** reinstall MSCS.

The cluster nodes at the target site must be rebooted after you perform the site failover procedures.



Initiator site failback

When a new initiator site has been established or the original one restored, site operation can resume after a failback procedure has been performed. A failback procedure involves synchronizing both the initiator and target storage subsystems so that operation can be returned to the initiator with minimal downtime. Verify that all components at both sites are operational before performing a failback.

The failback sequence is a scheduled event based on the configuration at the failback site. The storage controller requires that a viable dual-redundant storage subsystem be available before a failback can take place. Failback to a single controller configuration is not supported. A small amount of downtime is required during the failback process.

IMPORTANT: The cluster is not available during initiator site failback. Consider this downtime when scheduling a failback procedure.

Simple failback procedure for a planned failover

Use the simple failback procedure described in the DRM guide if the site failover is for a scheduled event.

The cluster nodes at both sites must be rebooted after you perform a simple failback procedure. The cluster will start normally and applications and data accessed by means of MSCS will be available.

Full failback procedure for an unplanned failover

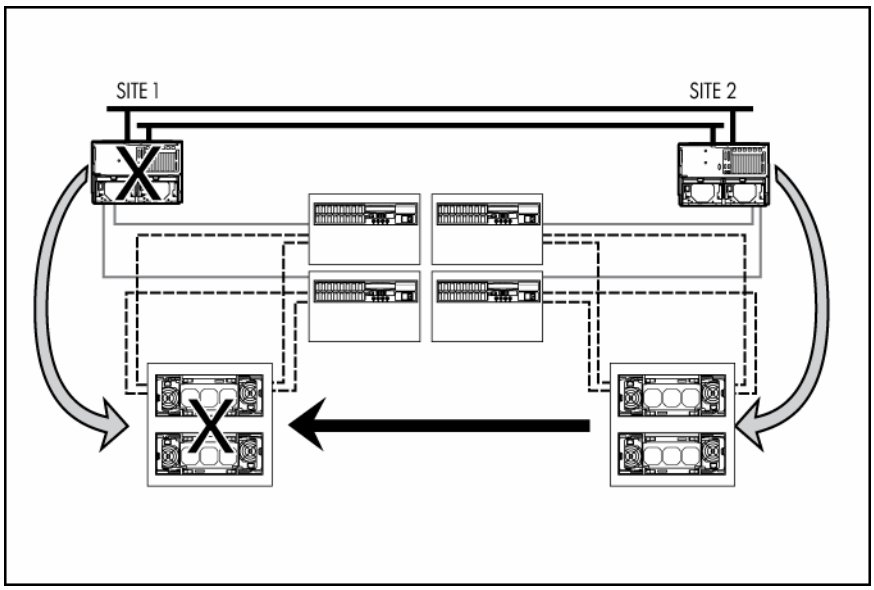
One of two procedures must be used for the site failback if the site failover is for an unplanned event. The procedure that you use is determined by the state of the initiator site.

- If the initiator site is intact, meaning that the servers and storage are still usable, perform the full failback procedure described in the DRM guide.

  The cluster nodes at both sites must be rebooted after you perform a full failback procedure. The cluster will start normally, and applications and data accessed by means of MSCS will be available.
- Perform the new hardware failback procedure described in the DRM guide if the initiator site is not intact, that is, the servers and storage must be replaced.

IMPORTANT: MSCS must be reinstalled on the initiator site after a new hardware failback procedure is performed for an unplanned failover in an F500 DT cluster. Do **not** reinstall MSCS on the target site.

The operating system and MSCS must be reinstalled on the server at the initiator site if a new hardware failback procedure has been performed. Remove the failed server from the cluster before reinstalling the operating system and MSCS and then join the existing cluster.



Zoning worksheets

In this section

Site A zoning worksheet

Locate and record the WWNs of each host on the zoning worksheet. Keep a copy of all worksheets at all your sites.

Host WWN#	Domain ID#	Port #	Alias name	Site/location

Site B zoning worksheet

Locate and record the WWNs of each host on the zoning worksheet. Keep a copy of all worksheets at all your sites.

Host WWN#	Domain ID#	Port #	Alias name	Site/location

Host WWN#	Domain ID#	Port #	Alias name	Site/location

Connection naming worksheet

In this section

Connection naming worksheet

!NEWCONxx	World wide name	Host name	Path Number

Technical support

In this section

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For the name of the nearest HP authorized reseller:

- In the United States, see the HP US service locator webpage (http://www.hp.com/service_locator).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (http://www.hp.com).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

Acronyms and abbreviations

ACS

Array Controller Software (on page 58)

ATM

asynchronous transfer mode

CLI

Command Line Interface

DNS

domain name system

DR

Data Replication

DRM

Data Replication Manager

DT

disaster tolerant

EMU

environmental monitoring unit

EVA

Enterprise Virtual Array (on page 58)

FCA

Fibre Channel adapter

FCIP

Fibre Channel over Internet Protocol

FDDI

Fibre Data Distributed Interface

GBIC

Gigabit Interface Converter

HBA

host bus adapter (on page 58)

ISL

intersite link

LUN

logical unit number

MSCS

Microsoft® Cluster Server/Service

NIC

network interface controller

OCP

Operator Control Panel

OSG

Open Systems Gateway

PDU

power distribution unit

SAN

storage area network

SFP

small form-factor pluggable

SMA

Storage Management Appliance

SWCC

StorageWorks Command Console

VD

virtual disk

WWN

World Wide Name

Glossary

Array Controller Software

Software contained on a removable ROM program card that provides the operating system for the array controller.

cluster

A group of systems that work collectively as a single system to provide fast, uninterrupted computing service. Clustering is a way to increase availability, processing capacity, and I/O bandwidth.

Enterprise Virtual Array

The HP name used to describe the storage system that includes HSV controllers, storage devices, enclosures, cables, and power supplies. *Also known as* the Enterprise Storage System.

failback (cluster)

1. The process that takes place when a previously failed controller is repaired or replaced and reassumes the workload from a companion controller.
2. The process that takes place when the operation of a previously failed cluster group moves from one cluster node back to its primary node.

failover (cluster)

1. The process that takes place when one controller in a dual-redundant configuration assumes the workload of a failed companion controller. Failover continues until the failed controller is repaired or replaced.
2. The process that takes place when the operation of a cluster group moves from one cluster node to another node in the same cluster.

Fibre Channel

An IEEE standard for providing high-speed data transfer among workstations, servers, mainframes, supercomputers, desktop computers, storage devices, and display devices.

Fibre Channel Adapter

An adapter used to connect the host server to the fabric.

high availability

A term used to identify a computer system that can continuously deliver services to its clients 99.9 % of the time (no more than 8.5 hours of downtime per year).

host

The primary or controlling computer in a system of computers connected by communication links.

host bus adapter

A card used to connect a peripheral device to a host server.

logical unit

Commonly called a LUN (which is the acronym for logical unit number). A physical or virtual device addressable through a target ID number. Logical units use the target bus connection to communicate on the SCSI bus. The host sees a virtual disk as a logical unit.

logical unit number

1. A value that identifies a specific logical unit belonging to a SCSI target ID number. LUN is commonly used in reference to a logical unit.
2. A number associated with a physical device unit during the I/O operations of a task. Each task in the system must establish its own correspondence between logical unit numbers and physical devices.

maintenance terminal

An EIA-423-compatible terminal used with the controller. This terminal is used to identify the controller, enable host paths, enter configuration information, and check the controller status.

Virtual Controller Software

Software used by the HSV controllers.

World Wide Name

World Wide Name. A unique Fibre Channel identifier consisting of a 16-character hexadecimal number. A WWN is required for each Fibre Channel communication port.

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